The Builder.

VOL. LI. No. 2273. SATURDAY, AUGUST 28, 1886.

ILLUSTRATIONS.

Window in the new City of London Schools.—Designed and Executed by Messrs. Heaton, Butler, & Bayne 306-307
Birmingham Law Courts: Second Competition.—Design by Messrs. Bateman & Hunt, Architects 310-311
Some Places Visited on the Cambrian Archæological Society's Excursion: Oystermouth Castle and Margam Abbey 314
A Warehouse Façade.—Designed by Mr. W. Stirling 315
Sketches on the Architectural Association Excursion: North-West Angle of Quadrangle of Ightham Mote House, Kent; Birling Church; and West Front of Malling Abbey 318, 319

CONTENTS.

A Sanitary Retrospect 295
Preservation of Wood. By George R. Tweedie, F.C.S., F.R.M.S. 296
Notes 298
The Chester Meeting of the Royal Archæological Institute 300
The Revival of Trade by the Development of India 303
Window in the New City of London Schools 304
Birmingham Law Courts: Second Competition.—Design by Messrs. Bateman & Hunt 304
A Warehouse Façade 304
Places visited on the Cambrian Archæological Association Excursion 304
Sketches on the Architectural Association Excursion 304
Panelling, Convocation Hall, Oxford 321
Notes at the Liverpool Exhibition 321
Cambrian Archæological Association 322
Fog Ponds 323
The Architectural Association's Visit to Oxford 323
Shadwell Hospital Competition 324
Charging for Clerks' Overtime 324
Episcopal Heraldry 324
Quarry Tile Floors 324
The Student's Column: Stone Quarries.—IX. 324
Recent Patents 325
Recent Sales of Property 325
Dennett & Ingle's Fireproof Construction 326
Miscellanea 326
Prices Current of Building Materials 327

A Sanitary Retrospect.

THE sanitary management of towns, whether large or small, has not yet in all respects been satisfactorily put in train, although it is fifty years (1836) since the first attempt was made to bring things into something like order by the appointment of a Registrar-General to collate, by the means then first given to him, such information as would enable the originators of the sanitary movement to take some steps towards an alteration of the state of things which then existed. In the previous year (1835) the Municipal Corporations Act was passed, putting all large towns desiring to adopt the Act upon a basis of local self-government, but it did little or nothing in directing the proper sanitary management of towns, and did not recognise the principle that prevention is better than cure. It appears to have been overlooked that local government consists of the management of those things which are necessary to the health and general welfare of people as well as of those which are of the nature of convenience, such as the removal of obstructions to the public traffic, the cleansing and lighting of the streets, and the protection of persons and property from violence and theft under the directions of a Watch Committee,—the principal committee contemplated, and specially named in the Act. But on the first report of the Registrar-General being presented to Parliament, in 1839, a Select Committee was appointed to inquire into the health of towns, who reported in 1840 that buildings in towns should be better regulated, and sewers constructed, under the direction of local boards of health. At that time people were buried in churchyards in the middle of towns, and the report showed the evils of that, also the importance of providing open spaces in crowded cities, the superintendence of lodging-houses, the advantages which would result from the establishment of public baths, and the importance of water supply. Mr. Edwin Chadwick reported, in 1842, the results of the inquiry ordered in 1839, describing particularly the sanitary condition of the labouring population, and giving evidence of the beneficial effect of preventive measures in raising the standard of health; and, in 1843, Sir Robert Peel issued a Royal Commission to inquire into the state of large towns and populous districts, and the inquiry was specially directed to the causes of prevalent disease, and to the best means of improving the public health by proper drainage, water supply, and building regulations; the evidence being clear, in fifty towns examined, that an excessive mortality was attributable to defective drainage and other causes capable of removal. The then existing law respecting drainage, namely, the Statute of Sewers, was in respect only of surface-drainage; and in most of the large towns no house-drains could be connected with the sewers without special permission of the Sewer Commissioners. There are people who say that it would have been a good thing if this prohibition had been continued to the present time, but their objection has reference solely to the connexion of water-closets with the sewers; the refuse-water from kitchens, pantries, and sculleries must be carried off either by open or covered drains and sewers, and, as open channels would not be permissible in towns, there remains but one course to pursue. The case is different with respect to waterclosets. There is no absolute necessity for these, and their continued use is a question of expense only; but where the system has been generally adopted it had better be continued, for with whatever objection it may be viewed it has advantages which could not be had in any other way. There was, at the time mentioned, no provision for water being supplied into houses, and only in some cases that mains should be laid in the principal streets, and general uncleanliness and deficiency of water were the result, especially in the poorer parts of towns. But it appears that, notwithstanding the reports made, the legislation did not move with any rapidity; and on this head it was remarked in the *Builder* of the 7th June, 1845:—"The Fabian policy of Government with respect to the sanitary condition of towns and the consequent moral improvement of the industrial population challenges remark at this advanced period of the Session, the more so as nothing yet has been even proposed. Her Majesty, in her speech from the throne last February, emphatically said that it would be highly gratifying to her if Parliament could devise the means of promoting the health of her subjects. This gratification the Government appear disposed to withhold, at least for the present. They have already issued their fiat that light and air are still to be paid for, and have contented themselves with simply announcing that a general measure is in embryo, but, when to be brought forth, or if at all, there is no pledge. We are much disposed to fear that autumn will find the health of towns in precisely the same condition that spring did. Bills affecting the rich have been known to pass through their various stages with an almost electric speed; is there any enactment to prevent the same potent spell being applied to Bills affecting the poor? If not, then there may yet be hope during the present session." In the same year, 1845, the Health of Towns Commissioners presented to Parliament their second report, recommending that the Crown should inspect and supervise the sanitary improvement of towns and populous places; that local authorities should have more power, and that their districts should be enlarged; that the necessary arrangements for drainage, paving, cleansing, regulating buildings, and water supply, should be under one administrative body; and that there should be compulsory rating for water supply, as well as for sewerage.

The legislation required for accomplishing these purposes was commenced in the following year, 1846, by the passing of the first of a series of Acts for the removal of nuisances, Justices in petty sessions being the adjudicators on the information of Town Councils or other town authorities, and also Boards of Guardians; and by the introduction of these bodies among the authorities for these purposes the first extension of sanitary legislation to rural districts was made. This Act was to remain in force until the end of the session of 1848, and under it the Privy Council might make regulations for the prevention of formidable diseases.

On many special occasions, both before and after the passing of the Municipal Corporations Act of 1835, an Act of Parliament had been obtained by towns for various purposes, chiefly of convenience, but including some provisions for necessary works, and comparing the provisions of these local Acts they were found to embody nearly the same clauses, and in 1847 a general Towns Improvement Clauses Act was passed, together with a Towns Police Clauses Act, consolidating the several provisions which had usually been asked for in the special local Acts, and by thus making provision for many of the requisites of Local Government further legislation was facilitated; and the provisions of the Towns Improvements Clauses Act have been very generally adopted in subsequent legislation for local government. They bear the impress of a practical knowledge of what was asked for and how to carry it out, and this cannot be said of all Acts of Parliament which have been passed for similar purposes: some of them have been inconsistent, one part with another.

The first great and comprehensive measure, the groundwork of the sanitary legislation of this country, was the Public Health Act of 1848. For many years its wisdom was much called in question because of its apparently arbitrary powers; but these were much overrated, for it could not be put in force unless petitioned for by ratepayers, except where the

mortality exceeded 23 in 1,000 per annum, and only so when this was the average rate of mortality of the seven previous years. It did not extend beyond England and Wales, and did not include the metropolis. The powers specified were for enabling the construction and management, by local authorities, of sewerage and house drainage, the regulation of the width of streets and the levels of the lowest floors of dwelling-houses, cleansing streets and courts, the removal of house refuse, the regulation of offensive trades and slaughter-houses, common lodging-houses, and cellar dwellings; paving streets, and the purchase of premises to improve streets; the forming of public recreation grounds; supply of water to houses and to public baths and trades and drinking-fountains; the construction of houses for the dead; burial-grounds, and the purchase of lands for any of the above-named purposes under the provisions of the Lands Clauses Consolidation Acts.

When a town applied for and adopted the Public Health Act it was constituted a Local Board of Health, existing town councils being so named for the purposes of the Act, as well as those independent bodies of Improvement Commissioners who had obtained each for itself a special Act of Parliament, usually embodying the Towns Improvement Clauses Act and some others, and who were (and continue) nearly of the same constitution as local boards of health. Under the facilities afforded by the Public Health Act, 1848, towns began to carry out sewerage and drainage, water supply, and other sanitary works, of their own local motion, but subject to a provision of the general Act that these works should be approved by the General Board of Health.

There arose an unfortunate and very regretable opposition to this by the civil engineers, some of whom were, and many more expected to be, employed in designing and carrying out these works, but who were not pleased at having to submit their plans for approval to those who were not, as they thought, qualified to sit in judgment upon them; and although, probably, they were wrong in this supposition on the whole, yet an unfortunate thing happened and was published which confirmed the justice of their tirade against the General Board of Health. It was a very natural thing that in proposing to offer certain necessary directions to local boards in the execution of works the General Board should desire to see such works carried out without unnecessary expense; for in directing works to be done at the local expense the Board had to consider the interests of the contributors to the expense as well as the interests of the inhabitants in general; and it seemed, from the fact that Captain Vetch, R.E., Captain Denison, R.E., and others were called in to report upon sanitary works, that there was a disposition to oust the civil engineers from their legitimate position, and especially so when the Board directed experiments to be made on the flow of water in pipes with the view to prove that the knowledge of hydraulics which the civil engineers had always acted upon was wrong.

But civil engineers in England have always had a very proper faith in the authorities on hydraulics, having always found their dicta borne out by facts when opportunities have occurred for independent experiments. The persons entrusted with the trials on behalf of the General Board of Health were the Surveyors of Sewers under the Commissioners of Metropolitan Sewers, and not only were their experiments very crude, and few in number, but they were published in a blue book, as if to confound all established knowledge on that subject. It was easy, however, for the engineers to show that the experimenters had neglected several of the precautions ordered by the authorities on hydraulics to be taken in all such cases, and that the very results erroneously arrived at by the Board had often been pointed out as likely to occur if proper precautions were not taken; and, in short, the proceedings of the Board in this matter were exposed to severe criticism. Nevertheless, it was a thing apart from the merits of the Public Health Act, and by making too much of it the engineers showed no great wisdom. It had, however, some effect in shaking public confidence in the proceedings of the Board, especially in what was called their arbitrary attempt to direct the proceedings of local boards of health. These latter were willing enough,—too willing,—to be undirected, and rather enjoyed the temporary discomfiture of the great Board; but partly because time has ameliorated the memory of the escapade, and partly from the necessity of the position, all designs for carrying out sanitary works by loans of money obtained through the Government must still to-day be approved by an Inspector of the Local Government Board, if for no other reason, yet for the important one of seeing that no undue extravagance is indulged in by local boards under the ostensible plea of providing for sanitary requirements.

PRESERVATION OF WOOD.*

BY GEORGE R. TWEEDIE, F.C.S., F.R.M.S.

THE class of expedients which fall under the heading of superficial injection or immersion in antiseptic or other preservative solutions, differ essentially from those that have already been discussed, inasmuch as there is a certain degree of penetration into the pores of the wood of the solutions employed.

In commencing the consideration of this part of the subject, it will be desirable to direct particular attention to a fact too often overlooked by patentees, viz., that crystallisable salts, and especially those which absorb water readily, possess the great disadvantage (if the penetration of the wood be at all considerable, and if it be not considerable the employment of such salts is, as a rule at any rate, a very useless expense) of being liable to crystallise, thus causing a splitting apart of the fibres of the wood, and an increased tendency to absorb water in damp situations. There can be no doubt that those preservatives are most suitable that render insoluble and less putrescible the nitrogenous constituents of the wood, and that alter to the least possible extent the natural structure of the wood; and, moreover, a good preservative should possess no tendency to crystallise or to absorb water. Further, the perfect preservative should be insoluble in water, incapable of appreciable volatilisation, especially in warm situations, and necessarily, of course, it should be a perfect antiseptic, and poisonous or inimical to insect life of every description. In addition to these qualities, it should not increase the combustibility of wood treated with it. How seldom these conditions are satisfactorily fulfilled will be understood after some of the principal processes have been passed in review.

Corrosive sublimate or chloride of mercury solution (one pound of the salt to five gallons of the water) has been employed with a measure of success in the process well known as "Kyanising," though according to Boulton it has invariably failed, like all other processes which involved the use of salts of metals, when the treated woodwork was exposed to the prolonged action of sea-water.

The action of the salt is to render unsoluble the nitrogenous constituents of the wood, and by its powerfully poisonous nature to prevent the development of spores of fungi or the attacks of insects. There can be no doubt that this material does increase the longevity of wood treated with it to a very considerable extent, especially when the wood is not constantly submerged. An experiment well illustrates this. Deal planks were exposed to most unfavourable conditions. In one year those that had been unprepared were rotten; those that had been "Kyanised" remained sound for seven years, and then began slowly to decay; whilst, it may be added, that those that had been "creosoted," —a process to be described later on,—were found to be sound after twelve years' exposure.

The corrosive sublimate can be applied either by injection, or by simple immersion, for from seven to twenty-one days.

Although Mr. Kyan was the patentee of this once important process, the use of this salt in this particular direction was first suggested by Sir Humphry Davy.

Dutrochet's experiments show that mercury salts were the most effectual in preventing growth of fungi; salts of copper, nickel, and cobalt come next; iron, antimony, and zinc seem to have little effect; whilst those of tin and lead were worse than useless. These experiments are not, however, by any means conclusive, nor does experience always agree with the results obtained.

Salts of zinc have been largely used. Sir William Burnett's process (patented 1836) involving the use of chloride of zinc, was at one time very widely adopted. The action of the chloride is to coagulate the vegetable albumen, and it is also, to some extent, inimical to the attacks of fungi and insects. In the original specification a strength of about one pound of the salt to five gallons of water was recommended, and the wood was to be immersed in the solution for from ten to twenty-one days. A defect, shared by chloride of zinc in common with a large number of other metallic salts used in preservative solutions, is, that iron and copper nails inserted in wood that has been treated with them are liable to rapid corrosion, especially if at all exposed to moisture.

The absorption of this and other preservative solutions is said to be much facilitated by taking advantage of the expansion of the wood by heating it to the highest possible point consistent with avoidance of damage to its structure, and then plunging it into the bath of preservative, so that as the fibres cool and contract the liquid is, to some extent, sucked in.

Other patents, involving the use of zinc salts, are those of Boulton (Pat. 62, 1882), and of Roper (Pat. 3,761, 1882). In the former a combination of tar and tar products with naphthalene, chloride and sulphate of zinc, and alkalies is recommended. In the latter the wood is first impregnated with sulphate of zinc and then with chloride of calcium; in this way double decomposition results, the insoluble sulphate of calcium which is formed closing the pores of the wood and locking in, as it were, the greater part of the chloride of zinc formed, at the same time.

Sulphate of iron was patented by M. Bréant as a preservative of timber in 1837, and it enters into the composition of many patented mixtures. As recently as 1883 a method was patented in which the timber was first to be placed in a vessel with water heated up to 248° F., and then plunged into a mixture of sulphate of iron and chloride of sodium (common salt), or lime water and alum.

In another patent it is recommended first to boil the wood in a solution of gallo-tannic acid, and then with sulphate of iron, or injection may be employed in the place of boiling. An obvious objection to this process is that the wood is rendered decidedly acid, a condition which would favour its decomposition; whilst the tannate of iron formed, in conjunction with the nitrogenous constituents of the sap, would, especially in warm, damp situations, favour the development of destructive ferments.

The most effectual mode of applying this material is that known as "Paynising" (patented by Mr. Payne in 1841). This consists in first filling the pores of the wood with chloride of calcium, followed by the application of sulphate of iron. In this way the insoluble sulphate of lime is formed in the body of the wood, which is rendered impervious, and as hard as stone. Chloride of iron takes the place of the sulphate, and is for the most part locked in the wood, but is of comparatively little use, the chief advantage of the process being the hard resistant surface given to the wood.

Copper salts alone, and in combination with other materials, have been largely used, and with a moderate degree of success, though for submarine woodwork it cannot be relied upon, as it affords no protection against teredo; and in fact, wherever the wood is exposed to the solvent action of water, soluble salts, like the sulphates, are useless. It is likely, as Boulton points out, that sulphates of copper

* See p. 260, *ante*.

might be most usefully employed in conjunction with oily and bituminous fluids, or even with oils which do not possess great potency as germicides.

In Margary's specification the acetate and sulphate of copper are mentioned as suitable, one pound of whichever salt is preferred being dissolved in four gallons of water, the length of the time of immersion being according to the thickness of the wood, two days for every inch being the recommended period.

The best mode of application, where the conditions are suitable, is that of Boucherie, once largely used in France, especially for telegraph-poles, which consisted in connecting the newly-fallen timber at one end, or in the middle, by means of suitable pipes and connexions, with a reservoir containing solution of sulphate of copper fixed at a height sufficient to enable the antiseptic to expel the sap from the timber and take its place. De Lafollye describes a series of experiments which were made with a view of discovering the change that sulphate of copper suffers when injected into green wood and wood in different stages of decay. Green wood absorbs large quantities of sulphate of copper, which gradually disappears without apparent change in the constitution of the wood. This observation, he remarks, leads to the assumption that the free salt, *per se*, is not the preserving medium, but that the antiseptic action is brought about by a certain quantity of the sulphate of copper having combined with the wood-cells. This circumstance does not apply to wood in a partial state of decay, such wood when used not merely loses all free sulphate of copper, but the quantity of combined salt diminishes in accordance with the progress of the decay. As to the preservation of telegraph-poles, De Lafollye further points out that young trees are more efficaciously preserved by the process than older ones.

In MM. Bazin & Hémery's patent the sulphate of copper solution is warmed to 60° or 70° C., after which the timber is immersed and kept heated for about twelve hours, and then "in order to cause the solution to enter the pores of the wood alternate currents of electricity are caused to pass through the wood by copper wires placed at either end of the timber and connected with a magneto-electric machine, or the logs may be merely thrown into an electrified bath. The wood becomes a conductor of electricity when heated and the electric current will carry with it the chemical solution."

Another patentee recommends boiling the wood in a mixture of sulphate of copper, caustic potash, alum, salt, lime, and water.

As specially useful for protecting wood-work from the ravages of the white ant, a mixture of arsenic acid and carbonate of soda dissolved in water and added to a strong solution of sulphate of copper has been patented.

Another patentee recommends the treatment of wood first with sulphate of copper and subsequently with chloride of barium, whereby the very insoluble sulphate of barium is formed in the pores of the wood, lessening the porosity of the wood and enabling it to retain a large proportion of the chloride of copper simultaneously formed. A further advantage is that the barium sulphate is poisonous, so that the wood would be less liable to the attacks of insects, &c.

Notwithstanding the comparative uselessness of salts of lead for preventing the decay of wood, various devices have been patented involving the employment of a soluble salt of lead, and subsequent treatment with a soluble sulphate and carbonate, whereby the corresponding insoluble lead salt is formed in the pores or on the surface of the wood.

Common salt and alum together and singly have been suggested as useful for the prevention of decay. The affinity of the former for water is a serious objection to its use, although in Holland in past times it was largely used for pickling ship-timbers, &c., whilst the preservative influence of sea water is well known in the case of oak, the colour of which it alters in many cases, as Mr. H. Maudslay has pointed out, to a peculiar green. Boiling sawn wood in carbonate of soda, a process which in the case of most woods would result in a serious disintegration of the fibres of the cell-walls and a consequent loss of strength and durability, has been patented. In another process the destructive operation of boiling with carbonate of soda or other alkali is recommended, followed by impregnation with a mixture of liquefied resin and silicate of potash or soda (soluble glass).

In an American patent, the wood is first treated with a solution of sulphate of soda or magnesium, and subsequently with barium chloride. The insoluble and poisonous barium sulphate thus formed is, of course, the preservative, by adding to the density and impermeability of the surface of the wood.

The use of the liquor obtained from saturated peat in its natural condition; the filling in of receptacles, grooves, recesses, and holes cut or bored in the timber, with poisonous and preservative substances, have also been the subject of various patents.

Very few of the above processes have any permanent value. In the majority, the preservative would be dissolved out of the wood by exposure in moist situations for a lengthened period. In a few the action is merely mechanical by closing the pores of the wood, whilst in not a few cases the internal constitution of the wood is so seriously modified that its structural usefulness is greatly lessened. A very large number of patentees seem to have been absolutely ignorant of the nature of the problem that they desired to solve; for example, compounds containing potash salts, phosphates, ammonia compounds, and urine, have all been patented, the probable effect of which would be to increase the liability to the very evils it was sought to avert, inasmuch as all these substances constitute excellent foods for the dry rot and other fungi.

Superficial treatment with hot whale and other oils was in former years considered useful, but the animal and vegetable oils have entirely given way to the oily and other products obtained in the distillation of tar. As regards tar itself, application in the hot state differs materially, and is far more efficacious, owing to the greater degree of absorption, than mere brushing with cold tar.

Crude creosote or oil of tar, crude petroleum, resin oil, carbolic acid either alone or in combination with other materials such as pitch, resin, silicates of potash and soda, mixtures of naphtha and creosote mixed with resinous substances and soda, naphthalene in a hot or boiling condition, have all been recommended. With respect to naphthalene, considerable difference of opinion exists as to its utility, but Dr. Tidy considers that it is "of infinitely greater value than at first sight appears. It is somewhat antiseptic, but its special value lies in rendering the wood more solid. The objection that its volatility is against it is met by the fact, proved by direct experiment and experience, that this loss is but superficial and soon ceases." These remarks were applied to the value of naphthalene as a constituent of so-called creosote, the material which stands at the head of the list of wood preservatives. True creosote is a product of the destructive distillation of wood, but the article used for timber-preserving is, to quote Tidy's definition, "a product of the distillation of coal tar after it has reached a temperature of about 100 deg. to 120 deg. Fahr.; in other words, after what is known as the light oil has distilled over."

Bethell was the first to utilise this material, and the process of pickling timber with it was for long known as "Bethellising" (Patent No. 7,731, 1838). In the original specification, however, the word creosote does not appear, but combinations of saline solutions and resinous or bituminous substances; coal tar, thinned with one-third to one-half its own quantity of dead oil, to which, if desired, caoutchouc or resin might be added, were mentioned. The impregnation of the wood was effected in a strong cylindrical vessel, connected with a powerful air-pump, so that by first producing a vacuum the pores of the wood might be as it were opened, enabling on the subsequent application of considerable pressure, the liquid to be forced into the substance of the wood. M. Bréant, in 1831, invented the first apparatus for injecting timber by means of alternate vacuum and pressure in a closed iron cylinder, but he employed as the preservative a mixture of linseed oil and resin. Another mode of "Bethellising" consisted in first placing the timber in a heating-chamber, and passing the products of combustion through it. When thoroughly dry it is taken out, and at once immersed in hot creosote in an open tank.

Although Bethell's name is most prominently associated with the use of creosote, coal-tar vapours had been used for preserving wood by Frantz Moll in England two years before Bethell took out his patent. Space will not allow of my entering into a full description of all the modifications and improvements in the application of creosote and coal-tar products; but those who desire more complete information cannot do better than obtain the reprint of Mr. S. B. Boulton's most excellent paper, "On the Antiseptic Treatment of Timber," read before the Institution of Civil Engineers, on May 6th, 1884.

A brief summary, however, of the chief facts connected with creosote and its allies, so far as their application to timber-preserving is concerned, will not be without value, and, indeed, this article would be singularly incomplete without it.

The complex nature of so-called creosote has yet to be completely unravelled, and varies considerably with the temperature at which the coal has been carbonised, and at which the subsequent distillation of the tar has been conducted.

The usefulness of the material, however, seems to depend chiefly upon the presence of the following materials:—

Naphthalene: the importance of this material has already been referred to, and the most practical authorities now prefer those oils which are rich in it, examination of creosoted sleepers of considerable age having shown that this substance was present in abundance, whilst the more immediately powerful tar acids were absent. In fact, creosoted timber, with plenty of naphthalene in it, will last far longer than that which has been treated with the much-vaunted tar acids, to which all the credit of the preservation used to be given.

Acridine is one of the alkaloids in coal tar oils of an intensely acrid and pungent character, a powerful antiseptic which, when once introduced into the timber, is not easily eliminated. Boulton is of opinion that it will come to be recognised as one of the most valuable constituents, for timber-preserving purposes, of tar oils.

Carbolic acid, although much over-estimated in some quarters, is doubtless of considerable value, as, owing to its active properties as an antiseptic, it prevents the development of dry rot fungi and the attacks of insects in new timber. Owing, however, to its great volatility and the unstable nature of its combinations, its power in this direction is only temporary. The proportion that should be present in good creosote varies, according to different authorities, from 5 per cent. to 9 per cent. Tidy, on the other hand, considers that only just as much of the acid as may be required to coagulate the albuminous constituents of the wood is necessary; whilst Koch considers the acid to be of but little use, even as a coagulator of albumen.

Heavy oils, which are those that do not distil under 600° F., are considered to be of great value, their impregnating power being large, besides which they possess antiseptic qualities, and are non-volatile.

The value of the above combination of materials, as found in creosote, is to be seen in the fact that eminent engineers have often preferred well-creosoted fir wood to oak in hydraulic engineering, as being both cheaper and more durable. Creosote, however, requires both judgment and experience in its application, and has sometimes entirely failed in consequence of the imperfect manipulation of the timber, or its own poor quality.

The conditions which ensure success are thus summarised by Tidy:—

1. That the timber be well dried, so that

the pores of the wood may be completely pervious.

2. That the creosote should be of a heavy rather than of a light description.

3. That as much creosote should be put into the timber as the timber can be made to absorb.

One or two methods of impregnation have already been briefly described. In some cases mere superficial protection is given by thinning down the creosote with lighter oils and brushing the thin liquid over the woodwork.

One or two patentees have recommended the use of steam, either ordinary or super-heated, mingled with vapours of creosote, carbolic acid, and similar substances, the wood being subjected to their influence in closed chambers.

In another patent the end of each piece of timber is left open to the air, so that the sap and moisture can be more readily withdrawn with the assistance of an air-pump, after which creosote, &c., is injected.

When timber is new or wet the impregnation by alternate vacuum and pressure processes is imperfect, owing to the large amount of water present, and various plans have been devised for getting rid of this obstructive excess. It is fully admitted, as already explained, that naturally seasoned or dried wood is in every respect preferable to that which has been artificially desiccated. Still there are many cases where time is of so much importance that the six or twelve months of stacking necessary to render the wood sufficiently dry is quite out of the question. In all such cases the process of Boulton seems to be the most suitable, in which the wet timber is heated under creosote in a vacuum up to 112° F. (if heated to 250° F. or 300° F. deterioration of the wood will commence). The heat being imparted through the oily medium will not injure the timber, from which the water is volatilised and drawn out by the air-pump. The creosote oils are not volatilised, as the temperature is far below their boiling point. The water is thus effectually removed from the wood and creosote takes its place.

In concluding this sketch of some of the many plans that are or have been in use for enabling the durability of timber to be extended, it may be pointed out that whilst good creosote most nearly fulfils the required conditions, yet there is one important objection that makes its use undesirable for certain classes of work, namely, that wood treated with it becomes more inflammable and burns more furiously than if untreated; in all cases where there may be special danger of fire a mineral preservative would be more suitable.

NOTES.

THE plans and sections of the site for the proposed new Edinburgh Municipal Offices, as issued to competitors, are very well and completely got out, and it was a good idea to add photographs of the existing and adjoining buildings; but this idea would have been still better carried out if each photograph had been numbered and lettered, with corresponding references on the plan, as the identification of the photographs with the various portions of the site is a rather troublesome matter, and in some cases the indications on the plan do not entirely tally with the facts as shown by the photographs. The restriction that until after the award, "no drawings, prints, photographs, or statements in print, writing, or otherwise, with reference to any of the competitive designs, are to be exhibited, sent, or communicated to any members of the Town Council, or to the public, or to any others, publicly or privately," is a very wholesome one, and will put a stop to the tactics of the gentlemen who on such occasions send round pamphlets of their designs to all concerned, in the effort to turn the flank of their rivals. Other provisions in the conditions are more questionable. The prohibition of perspective views has, to our thinking, only one merit: it equalises competitors more, and prevents the chance of a man with a long purse riding ahead of others by dint of merely paying professional "perspective hands" to get up alluring pictures on a large and costly scale. But why forbid every sort of shading, even "a shade line," and reduce a drawing to such an uninteresting cast-iron hardness of effect? Such a provision seems to show that the promoters of the competition have very little faith in their own discernment, if they are so afraid of being carried captive by a little bit of shading. This, however, is a minor matter; a much more serious one is the statement that the premiated designs are to become the absolute property of the Magistrates and Council, "who may then employ any architect they think fit to carry out the work." Unless this is intended as a mere formal safeguard, not to be acted upon unless in case of very exceptional circumstances, we can only call it a threat of unpardonable injustice and unfairness to the competitors. Do the Magistrates and Council suppose that the premium of 250*l.* is any adequate payment for a first-class design and plan for a building of this magnitude, or that any architect of genius would take that amount of trouble except with the expectation of carrying out the building? We hope the Edinburgh authorities will give some assurance that they intend to employ the successful architect to carry out the building unless there is any very exceptional reason against his employment, and that the best of the intending competitors will hold back until they get some such assurance.

OF the many reasons which have been put forth to account for the falling-off of English trade, we do not think that enough stress has been laid upon the action of the manufacturers themselves in bringing about the depression. The Report of the Sheffield Town Council Committee, which has been sitting for a considerable time, holding an inquiry on trade malpractices, reveals a state of things which is most discreditable to the cutlers of that town, and one which, if it prevails in other towns as it has done in Hallamshire, would be enough of itself to account for any amount of falling off. It appears that in consequence of many and grave complaints as to the quality of Sheffield goods of late years, a strict examination has been made, resulting in the discovery that large consignments of inferior German cutlery and tools are imported by Sheffield merchants and manufacturers; and though some of these are sold as confessedly of German make, the majority are sold as of Sheffield make, by false labels and description of the goods. Not only this, but low-class cutlery is turned out in Sheffield and sold to retail tradesmen and the public generally as first class, by means of untrue descriptions. A more disgraceful exposure of trade malpractices can scarcely be imagined, and the Sheffield makers will have themselves to thank if the once high character of their industrial produce leave them for ever. But they have done more than injure their own town and trade, for they have inflicted damage which it is impossible to over-estimate on English manufactured goods generally. What has taken place in Sheffield may equally well take place in Manchester, Leeds, Birmingham, or elsewhere, and the Committee are well advised in requesting the Town Council to petition in favour of Mr. Mundella's Trade Marks Act, in the hopes of checking such dubious practices.

THE Chairman of the London and North-Western Railway has illustrated very forcibly the inconvenience of the refusal of the companies at large to keep such accounts as should tell what is the cost of each department of the traffic. Mr. Moon says that in the last half-year this company have carried 500,000 fewer first-class passengers, 800,000 fewer second-class, and 6,000,000 more third class. Taking the fares at the 1874 rates of 2d., 1½d., and 1d., this change, as far as the information given goes, would be equal to carrying 3,800,000 additional third-class passengers. Setting off the 2,200,000 against the loss of the first and second class fares, the income of the company should be so much to the good, but, instead of this, there is a decrease in their receipts of 5,000*l.* in the half-year. It is therefore evident that counting passengers is idle, unless the length of the respective journeys is also given. What has actually taken place is, a serious decrease in the long traffic, chiefly of the first and second class, and a very great increase in the short traffic, chiefly in the third class. A diminished net profit of 55,000*l.* in six months is a matter of sufficient importance to the shareholders to demand a fuller explanation than the very inadequate one above cited. As the mileage was reduced by 110,000 miles, it is probable that the passenger traffic, if its accounts were kept by themselves, would be found to have improved during the half-year, as it is more lucrative for a company to run a well-filled third-class carriage than a first-class carriage with its average number of occupants. If the mileage were given, and the cost of the passenger traffic stated, it would be possible for the proprietors to see for themselves where the shoe pinches. As things stand they cannot do this.

THE half-yearly meeting of the Midland Railway also illustrated the imperfect nature of the accounts presented to the shareholders. There had been a decrease of 23,303 first-class passengers, and an increase of 350,000 third class. As far as this statement goes, it shows a net gain of 303,394 third-class passengers, which should have given a lucrative result. But the decline of receipts was 5,286*l.*, and the increase in receipts (third class) was only 3,000*l.* This makes the fare of each first-class passenger equal to 2s. 3d., and that of each third-class passenger about 2·6d.; so that the journeys of the former were ten times as long as those of the latter. This is a change to which the Chairman has called no attention whatever. It is one of a far more serious nature than the mere change of class by a passenger, as it shows, first, that the long traffic is declining; secondly, that the short traffic is increasing; and, thirdly, that the latter is so much less remunerative than the former as to show a material loss on the balance.

M. ARTHUR RHONÉ, the illustrious French archæologist, has published an interesting note on the probable effect of the construction of the proposed Metropolitan Railway at Paris. It appears that an entire *quartier* or neighbourhood formed by the Rue de la Grande-Truanderie and the ancient Ruelle Mondétour, with the Rues Piroutte and La Petite Truanderie, will be completely swept away without leaving a trace of these curious names, which have been immortalised by Victor Hugo in his "Notre Dame de Paris," and are celebrated in the annals of the old Paris of the Halles. At No. 5 of the Rue Piroutte is the Hôtel du Heaume, the last of the houses with arcades which surrounded the ancient *halles*. A long passage with a wood ceiling conducts to two open courtyards, surrounded by galleries with wooden columns, which have another outlet through the house No. 39, Rue de la Grande Truanderie. At No. 11, Rue Piroutte, is an ancient doorway, one of the columns of which is extremely curious. This house is marked upon the oldest plans of Paris. The well and pillory of the ancient Halles were in the immediate neighbourhood, on the site of what is now the Rue de Rambuteau. The name *piroutte* is said to be derived from the popular name of the pillory, which was made to revolve so as to expose the culprit to the four points of the horizon. Hard by the scaffold was frequently erected, and here perished in 1344 Olivier de Clisson, and in 1477 Jacques d'Armagnac, who were both accused of complicity with the English. The carrefour of the Ruelle Mondétour and of the Petite Truanderie, and the houses surrounding it, with their overhanging stories, their narrow frontages and winding stairs, are so well preserved that one realises at once the Paris of the Middle Ages so admirably described by Hugo; and M. Rhoné suggests, "why not retain intact this little fragment of an ancient city which brings so vividly before our eyes the life of the merchant and the artisan in the Middle Ages?"

The Metropolitan Railway threatens to demolish one of two hotels,—the Hôtel de Beavais, 68, Rue François-Miron, or the Hôtel d'Aumont, No. 5, Rue de Jouy, two buildings of the time of Louis XIV., both admirable in their way, although from different points of view. It is true that the railway undertakes to respect the town mansion of the archbishops of Sens, built in the reign of Charles V. on the outskirts of the royal residence of St. Pol, but it will pass so near that it cannot fail to become a dangerous neighbour to this charming edifice, which is only to be compared to the Hôtel Cluny, fortunately spared to us through the promptitude of the veteran M. Albert Lenoir. The railway will, however, destroy besides a modern market and a school, the Rue de l'Ave-Maria, and with it the doorway of the *Théâtre du Marais*, of which Molière, whose house still remains on the opposite side of the way, was the manager, and where the poet was arrested for a sum of some hundred and odd livres owing to his haberdasher and his candle-snuffer, two important personages in those days to the management of a theatre.

THE second fresco by Sir Frederick Leighton at the South Kensington Museum, entitled "The Arts of Peace," is now completed, and was first opened to inspection at a private view on Thursday. The fresco fills the lunette opposite to that in which is the companion work, "The Arts applied to War." Most frequenters of the Museum have seen the smaller monochrome study for the work, which for some time stood in the gallery where the wall painting (in Mr. Gambier Parry's "spirit fresco" method) is now completed. In "The Arts applied to War," the figures are nearly all those of men, the women only forming a subordinate group on one side of the picture. In the "Arts of Peace" women occupy the prominent and central position, in a carpeted alcove, with a semicircular screen of Classic architectural detail forming a background to the group. On either side of the composition are groups of nearly nude men engaged in landing merchandise, and in processes of manufacture; the mass of warm but subdued tone formed by their (conventional) flesh tints bringing out into prominence the gay and bright colours of the women's draperies in the centre portion. Several of the individual figures are very graceful, especially that of the woman on the right of the alcove, to whom a little girl holds up a mirror, and whose figure is half shown by the falling apart of the drapery; and the general effect, from a decorative point of view, is exceedingly successful. It should be judged of, however, from below, both in regard to the general colour effect, and also because the perspective of the architecture is drawn for view from below, and necessarily looks wrong from the level. The scene is on steps and platforms adjoining water, which forms the foreground. The boats shown may be regarded as conventional "decorative" boats, but it is a pity they are so obviously inefficient for practical purposes. That in which the man on the left is pushing off is quite too small for him and his merchandise, and from the alarmed expression of his face he seems painfully conscious of this. Sir Frederick, of course, may quote the precedent of those wonderfully impossible boats in Raffaelle's "Miraculous Draught of Fishes." It may be noted that in "The Arts applied to War" the dresses and architectural accessories are Gothic: in "The Arts of Peace," they are Classic; a distinction suitable enough.

A CORRESPONDENT of the *Journal des Artistes* has discovered in the little Church of Kermaria, near Portrieux, in Brittany, the remains of a fresco of a Dance of Death, in which the figures of the soldiers, the monk, and the king are yet visible; the costume is of the time of Louis XI., and indicates the probable date of the painting. In the sacristy of the same church are preserved a series of small marble bas-reliefs very finely executed, representing the history of the Virgin of the fifteenth century. The figures are of the spare and lengthy type, with long hands and pointed fingers, which one finds in the paintings of the period.

THE stones of Temple Bar and of its companion in misfortune, the colonnade of Burlington House, continue (by their friends) to cry aloud for rescue from oblivion. The *disjecta membra* of the old City gateway are still stowed away somewhere in the squalid and forlorn vicinity of Farringdon Market; and certainly neither the neglected stones nor the ruinous market can be quoted as favourable examples of the good effects of the fostering care of the "grand old Corporation" of London. According to a letter signed "Luke Limner, F.S.A.," which appeared in the *Times* a day or two ago, the stones of the Bar form a "happy hunting-ground" for the "printers' devils" and other working lads who there abound. The writer says that when he discovered the whereabouts of the stones he found these lads "chasing one another over a mouldy, dirty quarry, abrading with their hobnails all that remains of detail on what used to be our last City postern." Is it really too much to expect that the Corporation of London and the Benchers of the Temple should, between them, find a site for this interesting memorial of Old London? We have more than once published suggestions to this effect. Perhaps the stones of the colonnade of Burlington House are in even worse plight, for they are in the possession of Her Majesty's Office of Works, and lie scattered in Battersea Park. "Luke Limner" also calls attention (as we have frequently done) to the half-buried condition of the York Water Gate at the bottom of Buckingham-street, Strand (not "the Buckingham Gate," as the *Times* correspondent calls it). The Metropolitan Board of Works did, some time ago, scoop out some of the earth with which they had previously half-buried the gateway, but the only effect of this has been to leave the structure standing in a hole.

THE monument erected at Châtillon, near Paris, in memory of those who fell there in the last desperate struggle against the Germans, has been recently removed, and its removal has occasioned considerable correspondence in the French artistic papers, and inquiries are made as to who is responsible for what appears to be a gratuitous and ungrateful piece of meddling. The Commission for Historical Monuments and the Minister for War appear not to have been consulted on the subject. At the re-opening of Parliament, M. H. Michelin, Deputy for the Department of the Seine, intends to ask a question of the Minister for War with regard to the removal of the monument.

THE very fine carved oak stalls and return stalls from the former Carthusian monastery at Buxheim, in Bavaria, are to be sold at Messrs. Bonham's rooms in Oxford-street, on September the 1st, and are now on view there. The work is an excellent specimen of the rich and bold, if rather florid, carving of the seventeenth century. There are twelve stalls and three return stalls on each side. The arms and divisions are of pierced scroll-work, ornamented with fruit and garlands, and each terminating in a boy's head. The cornice is surmounted by a series of figures rather more than half life-size, and exceptionally beautifully executed, representing at the sides the twelve apostles, and on the return ends David, Moses, and two High Priests. Over the scrollwork between these figures boy angels lean forward playing various musical instruments. In the backs of the stalls are elaborately-carved niches, containing twenty-seven small figures, among which we noticed figures of SS. Philip Neri, Ignatius, Bridget, Odo, Francis, Dominic, and others. St. Augustine and two others are missing. Our Saviour occupies the niche on the right of the doorway, and the Blessed Virgin that on the left. The desks are equally elaborately carved in a similar manner to the stalls, but some of the figure work, which chiefly consists of boy angels and the like, struck us as being rather less excellent. The whole is said to have been carved by the monks themselves, and to have occupied them for fifty years. There have certainly been several, perhaps many, different hands and heads at work on them; both design and execution constantly vary in excellence in different parts, though all is good. We hope that such a work of art will fall into the hands of those who will appreciate and take good care of it. Meanwhile, those who do care for such things should see it.

THE new illustrated Catalogue of Terra-cotta Ornament and Moulded Bricks, issued by Mr. J. C. Edwards, of Ruabon, promises a great variety of well-executed moulded bricks to select from; decorative air bricks (some of them very good and original), and a large series of decorative pateræ and diapers in terra-cotta, to work with a specified number of brick courses. In regard to these latter, some judgment and selection is called for. It does not do to attempt too much in the way of patterns which are to be mechanically repeated. They should not attempt to rise to the rank of carving. The floral pateræ on plates 23 to 25, for instance,—those on plate 25 especially, — are too naturalistic in themselves, and when they come to be repeated, they only produce the effect of being a poor and mechanical substitute for carving. Mechanically repeated ornament should be of a simple and highly conventionalised type. Nos. 234 and 235 (plate 19) are good in this respect; they form good continuous diapers, with a certain amount of invention and ingenuity, but with no attempt at mimicking the higher effects of carving.

MR. C. M. SHINER, a London architect, has written to the *Daily News* in reference to the recent costly purchases of sites in the neighbourhood of St. Martin's-le-Grand for Post Office extension. He points out how the various departments under the control of the Postmaster-General are scattered about in different buildings, and proposes the concentration of all the departments on one site sufficiently central for the purpose. He contends that in spite of the recent costly extension of the existing Post Office sites, these will, after the lapse of a very few years, be found inadequate and incapable of further extension, except at an almost prohibitory cost. "Why," he asks, "cannot the recent example of Scotland-yard be followed and a fine site chosen, whereon the whole of the offices could be centralised?" "There is," he adds, "such a site in Holborn-circus, bounded by Holborn, Hatton-garden, Charles-street, and Leather-lane, nearer to all the great railway termini except Broad-street, nearer to the great news centre Fleet-street, exactly five minutes' walk from St. Martin's-le-Grand." This site, as Mr. Shiner says, has good approaches, and would afford large room for extension, and no doubt if all the offices could be concentrated there, and the costly sites of the existing buildings sold, the cost of the new building on the comparatively speaking cheaper site at Holborn-circus would be more than covered. But we do not think there is any likelihood of the scheme being adopted, seeing the great outlay that has been made upon Post-office buildings within the last few years.

THE attacks which have recently been made on the Royal Academy, to which we have already referred as by no means without excuse, have been unfortunately characterised by so much unfairness and misrepresentation that they are likely to end in creating a reaction in favour of the Academy. Whatever may be said of the shortcomings of recent Royal Academy exhibitions, and the absurdities of particular members who ought to give up exhibiting, it is clear that the special clique of painters who pride themselves on holding aloof from the Academy are an exceedingly crotchety sort of people, with very lax ideas about accuracy of statement. For example, it was most positively affirmed by Mr. Holman Hunt,

that the Academy refused any recognition of Mr. Burne Jones until they found they could not crush him by neglect; while it appears in reality that Mr. Burne Jones was twice invited to join, and refused. Other extravagant statements by Mr. Holman Hunt were completely disposed of in a letter from Sir F. Leighton to the *Pall Mall Gazette* two or three days ago. We certainly think the level of intellectual interest in the paintings exhibited of late at the Academy has been in the main very low; but no good will be done by getting up fanciful and imaginative charges against Academicians, scarcely any of which, it appears, can be substantiated as fact.

FROM the answer of the First Commissioner of Works to a question asked in the House on Monday last, it appears that the work at Westminster Hall, as designed by Mr. Pearson, is to be carried out (as, indeed, we expected it would be), and that Messrs. Shillitoe & Sons, of Bury St. Edmunds, have taken the contract. If it is to be carried out with the committee-rooms as planned, a very foolish piece of work is going to be done. How many people, we should like to know, are even now aware that one result of this foolish scheme will be to project a couple of staircases right into Westminster Hall and destroy its now unbroken area? Does Mr. Plunket know that? And will some one in the House who is possessed of a little architectural common sense ask him what he thinks of it?

THE CHESTER MEETING OF THE ROYAL ARCHÆOLOGICAL INSTITUTE.

CONCLUDING NOTICE.

WE this week conclude our account* of the recent Archæological Congress at Chester, and will resume by referring briefly to the excellent loan collection of antiquities shown in the temporary Museum at the Town Hall, of which Mr. G. W. Shrubsole and Mr. W. T. Ready were the curators. The collection included a large number of sketches, drawings, and etchings of Old Chester and buildings in the neighbourhood, by Cuitt, the late Mr. W. F. Ayrton, and Mr. Francis Nicholson. These were all lent by Mr. William Ayrton. Some water-colour drawings of old houses in Chester, by Mr. William Tasker, were lent by Mr. Edward Tasker. One of the most notable exhibits was a very beautifully modelled terra-cotta head of a statuette of Jupiter, found at Nemi by Sir Savile Lumley, and lent by Mr. R. P. Pullan. Some specimens of tiles found in Chester were exhibited by Mr. Shrubsole. The churchwardens' accounts of St. John's, Chester, in three volumes (extending over a period of nearly two centuries, viz., from 1633 to 1827), attracted much interest. There was a good display of municipal maces and other Corporation plate, and a golden torque found in 1816 by a miner near Holywell, from whom it was purchased by Earl Grosvenor for two hundred guineas. It is of fine gold, and simple in workmanship.

St. Mary's Church, Chester, was visited on the 10th inst., and the Rector, the Rev. H. Grantham, received the visitors and described the church. He observed that one of his predecessors, the Rev. W. Massie, had compiled a concise history of the church, but it had remained in MS., and the MS. had unfortunately been lost. He believed that no complete history of the church was to be found, although Ormerod and Hemingway gave some details of it. The church was given to the Abbey of St. Werburgh by the fourth Earl of Chester. After the Dissolution the rectory was granted to the Dean and Chapter of Chester, but the patronage of the living now belongs to the Westminster family. The east end of the south aisle of the church was the site of the Troutbeck Chapel. The agreement for building this is dated 1433, *temp.* Henry VI. A handsome monument formerly stood in the chapel, but the chapel fell down in 1660 and the monuments were destroyed. In 1690, on application being made to the Earl of Shrewsbury (the representative of the Troutbeck family), the ruins of the chapel were made over to the parishioners, and the present south aisle was erected on the site. The east end of the north aisle was formerly called St. Catherine's Chapel. It contains monuments of the Gamul family, including Edmund Gamul, Mayor of Chester, and Thomas Gamul, his son, Recorder of Chester in 1613. In the north aisle is a fine alabaster tomb in memory of Philip Oldfield, dated 1616. In 1578, according to Ormerod, the chancel window (over the Communion-table), the east window of St. Catherine's Chapel, and the windows next to the chapel, were filled with stained glass. There was no record when these windows were destroyed, but probably the destruction took place during the time the Parliamentary forces were in possession of the city, in 1647. The whole church, except the north aisle, was restored in 1861. The registers go back to the year 1628, and were nearly complete from that date. The church plate includes a very large flagon of the time of Queen Anne, and a silver-gilt chalice said to be of the time of Henry VII. or Henry VIII.; a *replica* or copy of this chalice, made in 1648, is also among the plate of this church. The church was choked up with galleries until its restoration, and small galleries still remain, being reserved for the soldiers, this being a garrison church. The roof of the nave is old, and in very good preservation, the bosses at the intersection of the moulded ribs being very sharp and clear. The roof of the north aisle is also old, but is in a very dilapidated state. It was mentioned by Mr. Grantham that a new church, dedicated to St. Mary, is being erected at Handbridge, on the opposite side of the Dee, at the cost of the Duke of Westminster. When this church is completed, the old church of St. Mary will be re-named "St. Bridget's," and will serve for the parish of St. Bridget in lieu of the "Classical" church erected fifty years ago in place of the ancient church of St. Bridget, which was removed in making the approach to the Grosvenor Bridge.

The visit to Llangollen and Valle Crucis Abbey, Chirk Castle, and Wrexham, on the 11th inst., was one of the pleasantest excursions of the meeting. Proceeding by rail to Llangollen, the visitors were conveyed thence in carriages to the remains of Valle Crucis Abbey, a very well-kept and interesting ruin. Here, in the first instance, Mr. R. P. Pullan addressed some observations to the party. He said that though this was one of the earliest of the Cistercian churches, it might be considered, in every respect, a model one. The church was cruciform in plan, with a tower at the crossing, the choir extending beyond the crossing. The conventual buildings were partly destroyed. Documentary evidence stated that the church was founded in the year 1200, but the geometrical tracery of the windows at the west end would be as late as 1270 or 1272. On the south side of the church there was what looked like a Norman door, though it could hardly be so. Probably all the architecture, except the tracery, was of the same date. He thought there must have been a wooden roof at the east end of the church, and probably at the west end also. The wheel window above the triplet at the west end must have been above the vaulting if this part of the church were vaulted. But he had come to the conclusion that the main body of the church was not vaulted, although in the two chapels on the south side there was vaulting.—Sir James Picton, pointing to some visible differences in the masonry of the inner face of the western gable at different stages, said he thought these differences, taken in conjunction with other things, indicated an intention to vault, though the intention had evidently been subsequently abandoned.—Adjourning to the remains of the conventual buildings, the visitors were again addressed by Mr. Pullan, who said that these buildings appeared to have been of no very great extent, and unfortunately the west and south sides had been entirely destroyed. The remains of the cloisters showed that they were roofed with wood, the corbels which carried the principals and struts still remaining.—Precentor Venables next made a few remarks as to the differences between the Benedictine and Cistercian plans. In the Benedictine houses the refectory was generally parallel to the nave, but in the Cistercian houses it was always at right angles. Sir James Picton said that although one of the doorways existing in the remains of the conventual buildings strikingly resembled Norman work at first sight, yet on close examination of the mouldings, &c., it would be found to have nothing Norman about it, except that the arch was semicircular. But he believed it to be the earliest part of the work, and it was possibly part of a former structure which might have occupied the site.—Leading the way to the interior of the Chapter House, which is vaulted, Mr. Pullan observed that this portion of the buildings was much later than the other portions. From the character of the mouldings and from the tracery of one of the windows, which was Flowing Decorated in character, he should put the date of the Chapter House at about 1350. One peculiarity about the Chapter-house is that there are no capitals to the columns which support the vaulted roof, the mouldings being continued upwards unbroken from column to arch. Another notable feature about this vaulting is its great massiveness. Returning to the area of the nave, the visitors listened to portions of a paper by Mr. G. Canning Richardson, on the history of the abbey. Mr. Richardson said that apart from its picturesque situation, the abbey was rendered more interesting from the fact that it is the only ruin of the kind (except Cymman Abbey) in North Wales. What remains of it shows that it at one time formed a noble pile of buildings, and a fine example of Early English architecture. "Valle Crucis,"—the vale of the cross,—is supposed, said Mr. Richardson, to have derived its name from the sepulchral cross called the Pillar of Eliseg, which, as hereafter stated, was subsequently visited. The Welsh name, Llan-y-gwestel, "the Church of Egwestel," suggested that someone named Egwestel founded a church here, and it was possible, said Mr. Richardson, that this secluded spot was hallowed by religious association before the Abbey was called into existence. Having quoted (from Camden, Dugdale, Leland, Pennant, Willis, and other writers) a number of passages relating to the Abbey, Mr. Richardson briefly referred to the architectural features of the buildings. He said that the beautiful rose window in the west wall, with the quatrefoil opening above it, were later by some eighty years than the lower portion of the wall, and dated probably about 1340. Between these two openings was a panel bearing an inscription to the effect that this part of the building was the work of an Abbot named Adam. As to other parts of the work, such as those carried out by the festive Abbot David, they, no doubt, appeared to be too early in style for the date assigned to them, but this was to be satisfactorily explained, Mr. Richardson thought, by the fact that the Welsh were always a little behind-hand in their knowledge of what was going on architecturally beyond the Border. It was commonly reported that the roof over the nave of Llangollen Church was taken from the Abbey, but Mr. Richardson said that he had satisfied himself, by careful measurements, that that could not have been the case. Down to the year 1851 the ruins of the abbey were in a sadly neglected state, but, thanks to the late Viscount Dungannon and to Mr. Wynne, of Peniarth, assisted by Mr. Penson and the late Rev. John Williams, the rubbish had been cleared out from between the walls and the ruins placed in their present satisfactory state. It may be added that the explanation of the plan of the buildings and their architectural features was facilitated by the exhibition of some measured drawings made by Mr. H. H. Hughes.

The visitors next drove to the Pillar of Eliseg, as to which Mr. R. S. Ferguson read some portions of a paper by Mr. Henry Baker. The pillar, which was formerly surmounted by a cross, is of carboniferous grit stone, and is stated to have been mutilated by some of Cromwell's adherents. It is said to have been one of the first lettered stones that succeeded the Meini-Hirion, Meini-Gwyr, and Llechau, and to have been erected by Concenn ap Cateli, in memory of his grandfather Eliseg.

After luncheon at the Hand Hotel, Llangollen, the carriages were taken to once more, and the visitors had a very pleasant ride to Offa's Dyke and Chirk Castle, traversing for several miles the very remarkable and excellent road made by Telford between Shrewsbury and Holyhead,—the Irish mail route in the coaching days. Arrived at a portion of Offa's Dyke, some discussion arose as to the intention with which this earthwork, which extended for many miles, was made. The general conclusion seemed to be that it was intended to serve as a boundary or fence specially adapted for the prevention of cattle-straying or cattle-"lifting" in the days when, as one speaker put it, Taffy was wont to come "to get a bit of beef." By the kindness

---

* See pp. 249, 265, *ante*.

of Mr. R. Middleton Biddulph, the visitors were allowed to visit Chirk Castle, which, now used as a residence, is strikingly and pleasantly situate on, and seems to grow out of, a respectable and well-wooded eminence. The interesting and multifarious contents of the castle, including King Charles's bedstead, were inspected.

Leaving the Castle, the visitors proceeded to Chirk Station to take train for Wrexham, where the church, remarkable for its very fine and rich Perpendicular tower, was visited. Mr. Pullan observed that this tower was one of the finest of its kind in existence, and was certainly the finest tower in the Principality of Wales. In fact, said the speaker, it is reckoned to be one of "the seven wonders of Wales." One thing worthy of remark about the tower was that the statues which filled the niches on its faces remained, having escaped the iconoclastic zeal both of the Reformers and of Cromwell's followers; and although, perhaps, some of them might have been restored, they were the original statues. The roof of the church is very rich, and more ornamented than usual, although it was not so rich a roof as that at Mold Church. Another remarkable feature about the church is its semi-octagonal apse, which, Mr. Pullan said, was a very uncommon feature in a Perpendicular church. It was curious to note that this apse had been thrown out eastward of the original square-ended chancel, the original window being opened out so as to serve as the new chancel arch, although, curiously enough, the "stumps" or terminations of the tracery are still left protruding from the top of the arch. Passing into the apse the original flanking buttresses and the hood-mould of what was originally the east window are still to be seen *in situ*.—Mr. Pullan's remarks were supplemented by a brief but interesting paper on the history of this church by Mr. Alfred N. Palmer, author of "The History of Ancient Tenures of Land in the Marches of North Wales," and who is now preparing for publication "A Systematic History of the Parish Church of Wrexham." Mr. Palmer, in his paper, said that the enlargements and improvements which ended, at the beginning of the sixteenth century, in giving to the building something of the appearance which it now presents, were intended, there was good reason to believe, to be preliminary to a projected collegiation of the church, the arrangements for which, though far advanced, were never completed. The two aisles are dissimilar. There are six side windows in the south aisle, corresponding to the six bays of the nave, while in the north aisle there are only five windows, which do not centre with the arches of the nave arcade.

In the evening, besides the opening of the Antiquarian Section with the Bishop of Chester's address, which was followed by the Rev. G. F. Browne's paper on "Early Sculptured Stones of Cheshire," as already mentioned, there was a meeting of the Historical Section, when Mr. H. Taylor, author of "The History of Flint Castle," read a paper upon "Grants of Welsh Land to Englishmen by Edward I."

"Chester and Liverpool in their Ancient Commercial Relations" was the subject of an interesting paper read, as already mentioned, by Sir James Picton, F.S.A., before the same Section. At the outset Sir James pointed out that the City of Chester is of Roman origin or adaptation, as shown by its plan, its Roman relics, and its walls. The reason for the selection of this site for a port combining a fortress and citadel is evident upon examination. The old coast line, which is very clearly marked around the neighbourhood, shows that at the advent of the Romans, the river Dee, here making a sudden curve to the westward, swept round the bluff on which the castle stands, leaving the Roodee or Roodeye a marshy island, and expanded into a wide and noble estuary, the waters of which flowed up to the very walls of the subsequent city, as evidenced by the existence of the old Water Tower, with its rings for the attachment of vessels, of the probable date of early in the thirteenth century. Few sites could have been more advantageous, whether for domination over the surrounding country, or for external commerce by sea, and under these circumstances the Roman city enjoyed a long career of prosperity, which is evidenced by its continued occupation for centuries by the victorious Twentieth Legion. It may naturally be asked, said Sir James, supposing the physical features in former ages to have been the same as at present, why the estuary of the Mersey, presenting deeper water and a much greater tidal flow, should not have been selected. The inquiry is an interesting one, and leads to very important conclusions. The ancient geographers, Ptolemy and Antoninus, in their descriptions of Britain, notice between the Orme's Head and the Peel of Foudry four estuaries,—the Seteian, receiving the outflow of the Deva or Dee; Belisama, identified with the Ribble; Setantiorum Portus, now the River Lune; and Moricambe, now Morecambe Bay. The Mersey is not noticed at all. There is another remarkable fact,—that most, if not all, the rivers have Celtic or Cymric names, with the exception of the Mersey. Whatever meaning may be attached to this word, it is undoubtedly Anglo-Saxon. Now, if the estuary of the Mersey had existed in its present condition during the dominion of the Romans, when the ancient geographers made their survey, it would have been impossible to ignore it, and it would have received a Romano-Celtic name like the others. The probabilities are that the wide expanse of the river between Wallasey Pool and Runcorn was at that time a lake, fed by the upper waters of the stream, the overflow of which found its way to the sea by the low marsh lands which intervened, including the Wallasey Leasowe, and that the barrier to the north was broken down either by gradual wearing away, or by a sudden irruption. This, it is probable, occurred almost contemporaneously with the Danish invasion and settlement in the district. "Walla's-ey," or island, a purely Norse name, points to the period when the eminence on which it is situated was surrounded by water, or, at least, by a marsh. It is this operation of nature which has given such unrivalled advantages to the port of Liverpool. Ages, however, elapsed before the advantages were appreciated. The reverse operation was going forward in the Dee, which was gradually shoaling, and its vast expanse silting up. The prestige, however, remained with Chester, which was slow to lose its supremacy. Towards the latter end of the twelfth century, after the partial conquest of Ireland by Strongbow and his filibusters, a necessity was felt for improved communication with the new realm. Accordingly, a place of embarkation was provided at Shotwick, about six miles below Chester, and a castle built for its protection. The castle has long been removed, but from a plan given by Randle Holme, it resembled much the Plantagenet castles of the time of King John. The impediments to the navigation still continuing, a new haven was constructed in the reign of Elizabeth, on the Flintshire side, to which the name of Queen's Ferry was attached. At a later period Parkgate was selected as the point of departure of the Irish packets, and of the ships called the "Cheesemen," which carried the dairy produce from Chester to London. But all did not avail; the estuary had become hopelessly silted up, and the attempts repeatedly made by the Dee Company to recover land from the river, and to improve the navigation, ended in failure. Nearly contemporary with the construction of the haven at Shotwick, at the beginning of the thirteenth century, it was discovered that a creek or pool existed on the Lancashire side of the estuary of the Mersey, admirably adapted for a haven or port, with access and deep water at all times of the tide. For the purpose of improved communication with Ireland, this opportunity was eagerly embraced by King John, who built a castle, laid out a small town, and by letters patent granted certain privileges to induce his liege subjects to settle there. This new settlement under royal patronage was called "Liverpul," and fully answered the purpose for which it was founded, though many ages intervened before it assumed any degree of importance. During a great part of this time Liverpool stood in a very subordinate position, being considered as a mere creek within the ancient jurisdiction of Chester, where the Government officers and Collectors of Customs resided, having deputies in Liverpool. The Corporation of Liverpool in the sixteenth century, seeing the growing commerce of their own town compared with the declining trade of Chester, felt aggrieved at this, and were determined to throw off the yoke of bondage. Sir James Picton said that circumstances had placed in his hands a large number of contemporary documents hitherto unpublished relating to these controversies, which throw considerable light on the state of commerce on the Dee and on the Mersey in the sixteenth and seventeenth centuries. Upon those documents, principally extracts from the official records of the Corporation of Liverpool, Sir James based the remainder of his exceedingly interesting paper. "The failure of the port of Chester," he said, in conclusion, "has been owing partly to natural causes, and partly to unskilful tampering with the channel of the Dee. The rise of Liverpool has been due to its natural advantages, and to the development of the manufacturing industry of Lancashire and Yorkshire. To the commerce of Chester in the Middle Ages we owe the quaint and ever-interesting architecture of her streets and Walls, which are in some respects unique. Long may they remain, carefully and lovingly preserved, calling up to our memories vivid pictures of the dear old England which we love so well."

After the meeting on Thursday, the 12th inst., of the Architectural Section, which was opened by Mr. Beresford Hope's address (already reported in our columns), a visit was paid to St. John's Church and the adjacent ruins. It is believed that a Saxon Church occupied this site, which is outside and a little to the eastward of the city walls. The existing church, as Sir James Picton pointed out, may be likened to a torso, consisting as it does of one bay only of the choir eastward of the crossing, the crossing itself (the transepts having gone), and four bays of the nave westward of the crossing. This fragment is on a scale which shows that when the building was entire it must have been a very fine one, and, as Sir James Picton pointed out, it is an excellent specimen of Transitional Norman work, well designed and admirable in its workmanship. The fine and lofty tower, it may be remembered, fell down about five years ago, crushing the beautiful porch of the church. The porch has since been rebuilt on the lines of the old one, and the tower is now in course of re-erection under the direction of Mr. John Douglas, architect, Chester. The Chapter-house and other adjacent remains are exceedingly picturesque and of much interest. St. John's, it should be stated, was formerly a cathedral, having been commenced by Peter, the first Norman Bishop of Lichfield, when he removed his seat to Chester. The Rev. S. Cooper Scott, the vicar, who received the visitors, has compiled an interesting statement of the history of the buildings, which may be purchased for a few pence by visitors. "A Short Account of the History and Architecture of the Church of St. John the Baptist, Chester," by Mr. Harry Beswick, architect, may also be perused with profit by the visitor. It is illustrated, and is published by Messrs. Phillipson & Golder, of Eastgate-row, Chester.

Proceeding next to the Chapter-house of the existing Cathedral, the visitors listened to an historical account of the building which was given by the Very Rev. Dr. Darby, Dean of Chester. Referring to the refectory, which is at present in a very dilapidated condition, the Dean said it was hoped that this fine apartment would be restored before very long, when it would serve as an admirable synod-house for the diocese. Mr. Blomfield estimated the cost of its restoration at 8,000*l*. Speaking of the restoration of the cathedral generally, as carried out by Sir Gilbert Scott, the Dean said he thought that, in some respects at least, it was not sufficiently reverential. After the Dean's address was concluded, the Rev. Precentor Venables conducted the visitors over the most interesting parts of the cathedral and its precincts. In the cloisters he gave a vivid account of the daily life of the monks, and pointed to some striking evidences of the utter disregard shown by Mediæval architects of one generation for the work of those of a preceding generation. In the refectory he pointed to the reading pulpit, which, he thought, was more beautiful than the one at Beaulieu Abbey. He strongly supported the proposal, referred to by the Dean, for restoring this fine hall and appropriating it as a "church-house" or meeting-place for the diocese. Whatever might be said of Sir Gilbert Scott's restoration, said Canon Venables, the present condition of the cathedral was, when contrasted with its condition before Dean Howson's time, satisfactory beyond comparison. When he (Canon Venables) first saw the cathedral it was the darkest, dreariest, dismalest, dirtiest, and most desolate place imaginable, and was a mere lounge, very much like "Paul's Walk" in Old St. Paul's, London. To the late Dean Howson

(whose grave in the cloister garth was pointed out) was due the credit of having evolved order and decency out of chaos and squalor. It may be added that both the Dean and Precentor Venables warmly commended the excellent little "Handbook to Chester Cathedral" written by Dean Howson.

In the afternoon the members proceeded by river-steamers to Eaton Hall, where they were entertained by the President of the Congress, the Duke of Westminster, and given full opportunity to inspect the state apartments of the princely mansion and its many works of art. The chapel and stables were also visited. The visitors returned to Chester in carriages, and in the evening, as already mentioned, were entertained at a *conversazione* given by the Mayor.

On Friday, the 13th inst., a large party proceeded by a special train to Malpas, where the church was visited, most of the visitors walking from the station to the church, a distance of about two miles, through the rain. They were received by the Rector, the Hon. and Rev. Trevor Kenyon. The church, as Mr. Pullan pointed out, is nearly all of Late Perpendicular date. It has a very elaborate and beautiful roof,—one of the richest in Cheshire. The aisle-roofs, too, are of unusual richness. The tower and portions of the chancel are anterior to the rest of the church, and belong to the Decorated period. The church seems to have been built by the Brereton family, and contains two fine altar-tombs belonging to the Brerетons and Cholmondeleys. There is a very peculiar bulge or irregularity in the south wall of the chancel,—an irregularity for which Mr. Pullan said he could only assign a structural reason, such as a difficulty with the foundation. The rector said that the church was dedicated to St. Oswald, but whether that fact pointed to the existence of a church here in the pre-Norman period he did not know. At the time of the Conquest a castle was built northward of the site of the present church, and, according to Ormerod, the church was within the castle walls. Probably this Norman church was entirely rebuilt in the fourteenth century, when a Decorated church arose, the ground-plan of which, Mr. Kenyon thought, was identical with that of the present structure. The tower and some portions of the chancel are of the Decorated period, but the east window was inserted in the fifteenth century, when the church was almost wholly rebuilt in the Perpendicular style.—Returning to the railway station, the rain having ceased, the party took train for Nantwich, and after partaking of luncheon in the Corn Exchange of that town, visited the church, which was described by Mr. Pullan. Nantwich Church, he said, is one of the finest and most remarkable of Cheshire churches. It is a rich example of Late Decorated work. The tower is octagonal, and the mouldings of the arches of the intersection are deep and rich. There is a curious stone pulpit attached to the screen, and approached from the choir. The stalls are remarkably rich. There was a tradition that they came from Vale Royal, but the accuracy with which they fit the choir (which is of somewhat peculiar plan, widening out by means of splays from the eastern side of the chancel-arch), and the absence of any signs of piecing, fitting, or adaptation, render this story very improbable. The Rector, the Rev. F. G. Blackburne, having pointed out some other features of the church, the party proceeded in carriages to Acton Church, which was inspected under the guidance of Mr. Pullan. The upper part of the tower is of very debased Gothic, *temp.* Charles I., but the lower part is of Early English work. The roof over the nave is a nondescript construction of Georgian Gothic. The arcade is Decorated work of a very pure character, the aisle windows being transitional between Decorated and Perpendicular. As will be inferred from this brief description, the church is a curious medley of good and bad work.—Proceeding next to Bunbury, the excursionists were received at the Church by the Rector, the Rev. W. Lowe, who described the church, the tower and chancel of which are of Decorated date, the nave being Perpendicular work *circa* 1450. The fine tomb of the founder, Sir Hugh Calveley, erected in 1416, was examined and described, as well as several other objects, of interest in the church. The Ridley Chapel, erected A.D. 1527 by Sir Ralph Egerton, was pointed to by Mr. Pullan as being remarkable for having been erected at a time of change not only in religion, but in art. The ornamentation of the screen shows the mingling of Classic details with Gothic forms. Mr. Lowe was very heartily commended for taking the pains to append detailed descriptive labels to the tombs and other interesting features of the church. The "Bunbury Lady," a curious carved stone figure strongly suggestive of a ship's figure-head, and which was not long ago disinterred from the churchyard, was seen by some of the visitors. It was, it appears, first erected in the church in memory of a Mrs. Henry Johnson, who died in 1741, but was subsequently ejected from the church on account of its "striking" character diverting the attention of some of the congregation, as well it might. Having thanked Mr. Lowe for his courtesy, the visitors drove to the foot of the rugged crag on which are the remains of Beeston Castle, which were described by the Rev. Precentor Venables. The castle, which commanded one of the three avenues to Chester from the south, was commenced in 1220 by Ranulph de Blundeville, sixth Earl of Chester, on his return from the Holy Land. The Precentor gave a graphic sketch of the historical events of which the castle was, in part, the scene, including the struggle between the Royalist and Parliamentary forces. The triumph of the latter led to the castle being "slighted," or, in other words, blown up by gunpowder. From the walls of the castle a splendid view of the surrounding country, with Peckforton Castle at no great distance, is obtainable. Resuming their carriages, the excursionists returned to Chester, where sectional meetings were held later in the evening. In the Antiquarian Section, Mr. J. P. Earwaker, F.S.A., read a paper on "The Marriage of Children in the Sixteenth Century, as illustrated by the Records of the Consistory Court of Chester."

Mr. T. H. Baylis, Q.C., also read an interesting paper before the Antiquarian Section, on "Treasure Trove." He said that although people had been accustomed to hear and to say, from their earliest childhood, that "Finding is keeping," that was a maxim which, like many others, was true only to a certain extent, for treasure-trove was an exception to the truth of the saying. It, therefore, became necessary to define treasure-trove, and to say who had a right to it. It was easy to infer that the word "trove" was derived from the French word *trouvé*, found. But what kind of treasure was meant, and where must it be found? How did it differ from other findings, and who was its owner? The word "treasure" in connexion with "treasure-trove" was confined to gold or silver money, coins, plate, or bullion. It must be found *hidden in* the earth, or walls, or chimneys, or other secret places. If found *on* the earth or in the sea, or not hidden, it is not treasure-trove. If the owner thereof or his representatives cannot be ascertained it belongs to the Crown or the grantees of the Crown. In very ancient times treasure-trove belonged to the finder, or to the owner of the soil. That the Crown became entitled to treasure trove many centuries ago is evident from the statute of the 4th of Edward I. (1275-6), which directs the coroner to hold an inquest to inquire, amongst other things, where treasure-trove is said to be found. In consequence of this right of the Crown to treasure-trove, it had very frequently happened that most valuable finds had not reached the hands of the authorities, but had found their way to the crucible. He (Mr. Baylis) was told that it was now the practice of the Crown to pay to the finder who brought it the intrinsic value of the gold and silver, or a part of it, but that did not hold out a sufficient inducement to the finder to deliver it up. He often retained it or disposed of it for his own profit, although illegally, for the intrinsic value of the find might be small, especially if it were of silver. He thought, therefore, that the Crown should reward the finder and owner of the soil by a percentage based on the real value of the treasure-trove. He was informed that treasure-trove, if rare and curious, was handed by the Government to the trustees of the British Museum, at a price.

In the Architectural Section, Mr. W. Shrubsole, F.G.S., read a paper on "The Age of the City Walls of Chester." The substance of this paper was printed in our last (see p. 267, *ante*). In the discussion which followed, the Rev. Dr. Bruce, F.S.A., in an interesting speech, endorsed the conclusions set forth by Mr. Shrubsole in his paper, as did other speakers.—Mr. Shrubsole, in the course of some supplementary remarks, gave some data for estimating the age of the stones of the walls by the extent of the weathering, the rate of which was known.—The Duke of Westminster, who presided, closed the discussion with the remark that he feared that he and most Cestrians would have to give up the belief that their city walls as they now existed were of Roman work, but they would do so with regret. In the same section, Mr. R. P. Pullan read a paper entitled "Observations on the Discovery of the Artemisium at Nemi,"—a discovery which was made by Sir Savile Lumley.

In the Historical Section, Mr. Alderman Charles Brown read a paper giving a short epitome of the charters at present in the possession of the Corporation of Chester. Fortunately, on the occasion of the lamentable fire which destroyed the old Town-hall on the evening of the 30th of December, 1861, the greater part of the valuable muniments were saved, together with the ancient corporate plate and the portraits of former mayors and benefactors of the city. The records thus saved from destruction remained for several years in a state of disorder in the old city gaol, but in the year 1878 a sub-committee of the Town Council (of which sub-committee the author was a member) was appointed to endeavour to bring them into order. The sub-committee fortunately obtained the assistance of Mr. John Cordy Jeaffreson, of the Public Record Office, who tabulated and arranged the documents in the muniment-room of the present Town-hall, where they are now to be seen. Mr. Jeaffreson, in his report, stated that "few cities possess archives so numerous and valuable as those which, after suffering severely from fire, damp, and other causes, have lately been arranged and deposited in the muniment-room of the Corporation. They consist of charters, municipal books, letters, civic grants and leases, and upwards of fourteen hundred sets of filed documents. The entire collection may be roughly computed to have in its several divisions more than 200,000 separate writings." Among the documents is one of the sixteenth year of Edward II. (1323), being an indenture of agreement between the Mayor and citizens of Chester and John Clypeston, for the building of the "new tower," now called the "Water Tower." Another document of interest in the collection is dated July 13, 1529 (20th Henry VIII.), and consists of a deed of grant for ever, by the Friars Minors of Chester, of the nave and three aisles of their church to the merchants and sailors of Chester, for a place in which to store and repair sails and other things requisite for their ships. Dated 1633 and 1634 are two commissions from the King (Charles I.) to the Mayor and Sheriffs to collect contributions for the repair of St. Paul's Cathedral, London. The charters and other documents included in the collection cover a period of upwards of 700 years.

On Saturday, the 14th inst., the visitors proceeded in carriages to Tarvin Church, which was explained by Mr. Pullan. In parts the work is of debased character, but the church contains some features of interest. There is a curious chapel or chantry on the south side, with a hagioscope. Beneath the east window is a remarkable Jacobean reredos, with carved panels representing incidents in the life of Our Lord.—Returning to the carriages, the excursionists were driven to Kelsburrow, in Delamere Forest (a great part of which hereabouts has of late years been disafforested and converted into arable land), where the course of the old Roman road to Mancunium (Manchester) was clearly seen, the rocky sides of the slope which it traversed remaining as left by the Romans. At Nettleford the junction of this road with one leading to Northwich was also inspected. At a spot called Organs Dale the surface ground had been removed, exhibiting what looked like ruts worn in the underlying red sandstone by cart-wheels, although it was suggested that these ruts had been cut by the Romans to facilitate the traffic,—a very questionable hypothesis, in the opinion of most of the visitors. It was pointed out that the gauge of the ruts is that of modern vehicles, and was too wide for the vehicles used by the Romans. Having climbed Eddisbury Hill to inspect the remains of some supposed Saxon earthworks, which, it was suggested, should be excavated, the visitors adjourned to a marquee at the rear of the Abbey Arms Inn for luncheon, and after-

wards visited Lob Slack (stated to mean "Devil's Bog") to further inspect and trace the course of the Roman roads. Some of the visitors returned by train from Cuddington Station, while others rode back to Chester in the carriages. There were sectional meetings in the evening. In the Antiquarian Section Mr. T. Rigby read a paper on "Old Farming Customs in Cheshire." In the Architectural Section Mr. I. M. Jones, City Surveyor of Chester, read a paper on "A Roman Hypocaust lately found in Chester." Of this paper we have already printed the substance.

On Monday, the 16th inst., the members started from Chester in carriages, proceeding in the first instance to Hawarden Castle, where they were received by Mr. W. H. Gladstone, and conducted over the ruins of the old castle,* which are in good preservation and are well cared for. Mr. Gladstone quoted from Mr. G. T. Clark's description of the buildings, which, standing on a lofty mound rising from the well-wooded park are exceedingly picturesque. This castle, like Beeston and others, was "slighted" by order of the victorious Parliamentary party in 1647. The visitors next proceeded to Hawarden church, which, Mr. Pullan observed, was very well restored by the late Sir Gilbert Scott, after its destruction by fire in 1857, though in a different style. When he (Mr. Pullan) made drawings of the building before the fire, it was wholly in the style of the Transition from Decorated to Perpendicular.—Having stayed a short time in the church the visitors were driven on to Mold, where, after luncheon, the church was visited. As Mr. Pullan remarked, this church is one of the richest specimens of Late Perpendicular to be found anywhere, and was evidently built by the Stanley family. The panelling in stone above the nave arcade is very unusual, but a similar feature will be found at Manchester Cathedral. The roofs at Mold are very elaborate. The church, like that at Wrexham, has a semi-octagonal apse. The church was restored by Sir Gilbert Scott. Among the monuments in the church is one to William Wynne, of Tower, "rector of Llanvechan, in this parish," who died in 1776. His epitaph informs us that

> "In conformity to ancient usage, from a proper regard to decency, and a concern for the health of his fellow-creatures, he was moved to give particular directions for being buried in the adjoining churchyard, and not in the church."

Alas for the good man's laudable intentions! They appear to have been complied with at the time, but some years later, when the church was extended eastward, his grave was included in the space taken in by the church, so that his remains now rest within the walls of the church after all. At the east end of the south aisle there is a curious, not to say ludicrous, monument in white marble to "Robert Davies, of Llanerch, esq.," who died in 1728. It is marked "H. Cheere, fecit.," and, we suppose, is meant to represent Robert Davies, not in his habit as he lived, but in a Roman toga and sandals, and wearing a study cap of the kind shown in portraits of Hogarth and Cowper. The figure, which is not bad in pose, has one elbow resting on the summit of what looks like a gigantic egg, which in its turn rests in what looks like an egg-cup a few sizes too large for it. After visiting the Bailey Hill, upon which Mr. Wynne Foulkes and Professor Clark made some remarks, the visitors drove to Caergwrle Castle, and having assembled at the top of the height within the walls, after a laborious climb, were rewarded with a very fine view of the surrounding country. A paper by the Rev. Precentor Venables (read in Gresford Church, as the weather was not very favourable for a prolonged stay at the castle) said that Caergwrle, like Beeston, seemed to be marked out by nature as a stronghold and place of refuge in troublous times. The first syllable of its name, "Caer," a camp, indicated that it was a military position in early British times. The paper, which gave a history of the stronghold and a brief architectural description, was preceded by some remarks made by Mr. Shrubsole on the spot. The last building visited on this day was the very fine Church at Gresford, restored by Street in 1866 or 1867. Here Mr. Trevor Parkins (in the absence of the vicar through illness) and Mr. Pullan addressed some observations to the company. The church is a fine Perpendicular building, dating from the time of Henry VII. What was described as its "great glory" is the remarkably fine and well-preserved chancel and aisle screens, which are very perfect in all their details, although unrestored. The window at the eastern end of the north aisle is mainly of old glass, and there is some old glass in the upper part of the east window. Both these windows have been well restored by Messrs. Clayton & Bell, who have also supplied some new windows of good and appropriate character. As a set-off, however, against this good record must be mentioned the window at the west end of the north aisle, which is of the painted calico transparency blind order of art, and is said to have come from Tours. Externally the stonework of the church is in admirable preservation, though it has never been touched since its erection. It is of grit stone of a very pleasant cream tint. In the churchyard the monster yew-tree was inspected. This tree was said by one of the company to be 1,500 years old, an age arrived at by a comparison of measurements of the tree with some of the surrounding yews whose age is matter of certainty. But this statement was evidently regarded by some of the visitors as one to be taken *cum grano*.

Returning by train to Chester, the members attended sectional meetings in the evening. In the Antiquarian Section, Mr. H. S. Skipton read a paper on "The History of Sport in Cheshire, with some Notice of the Grosvenors." In the Architectural Section, Sir Llewelyn Turner read a paper on "Carnarvon Castle," the substance of which we will give next week. Subsequently the closing general meeting was held, and thanks were voted to all and sundry who had in any way helped to promote the success of this very successful meeting.

Tuesday, the 17th inst., was the final day of the meeting, and an excursion was made to Flint, Conway, and Carnarvon Castles. At Flint Castle a brief but interesting explanatory lecture was delivered by Mr. Henry Taylor, Deputy-Constable of the Castle; and Conway Castle, which is in a far better state of preservation, was described by Sir Llewelyn Turner. The party reached Carnarvon about one o'clock, and, led by Sir Llewelyn Turner, proceeded through Bank Quay to St. Mary's Garrison Chapel, Carnarvon (where a halt was made for inspection), then along the promenade, past the Yacht Club-house, called Porth-ur-aur, or the "Golden Gate," which Sir Llewelyn suggested may have been so called either from its handsome appearance, or it might originally have been the scene of the receipt of custom. The back of Her Majesty's prison, the bond stones of the wall destroyed in Madoc's insurrection, the temporary substitute for this wall, and the Castle moat having been inspected, the party entered the castle, and at once proceeded to the drill-room of the R.N.A. Volunteers, where luncheon was partaken of on the invitation of Sir Llewelyn Turner. Subsequently the whole castle was examined in detail, Sir Llewelyn repeating most of the facts adduced in the paper read on the previous evening, as above mentioned. During part of the time that Carnarvon Castle was being explored, a number of the party, under the guidance of Mr. Thomson Watkin, visited the site of the old Roman town of Segontium, and the whole party returned to Chester by special train.

Thus ended a week of hard but pleasurable and healthful work.

* "Hawarden Castle," a name well known as that of the residence of the late Premier, is a modern castellated mansion, dating from 1752, and is on lower ground than the castle proper.

Destruction of a Norwegian Town by Fire.—The town of Skien, on the Christiania fjord, so well known to tourists proceeding to the beautiful province of Thelemarken, was last week destroyed by fire, which originated in a carpenter's shop by a drunken workman upsetting a gluepot in the fire. The fire raged for two days, destroying, among the principal buildings, the old Gothic cathedral, the damage being estimated at about half a million sterling. The only building of note saved was the branch of the Bank of Norway, which escaped through being nearly surrounded with lime-trees. The trees were very much scorched and withered, but arrested all approach of the fire to the building. Most of the houses were, as usual in Norway, of wood.

THE REVIVAL OF TRADE BY THE DEVELOPMENT OF INDIA.*

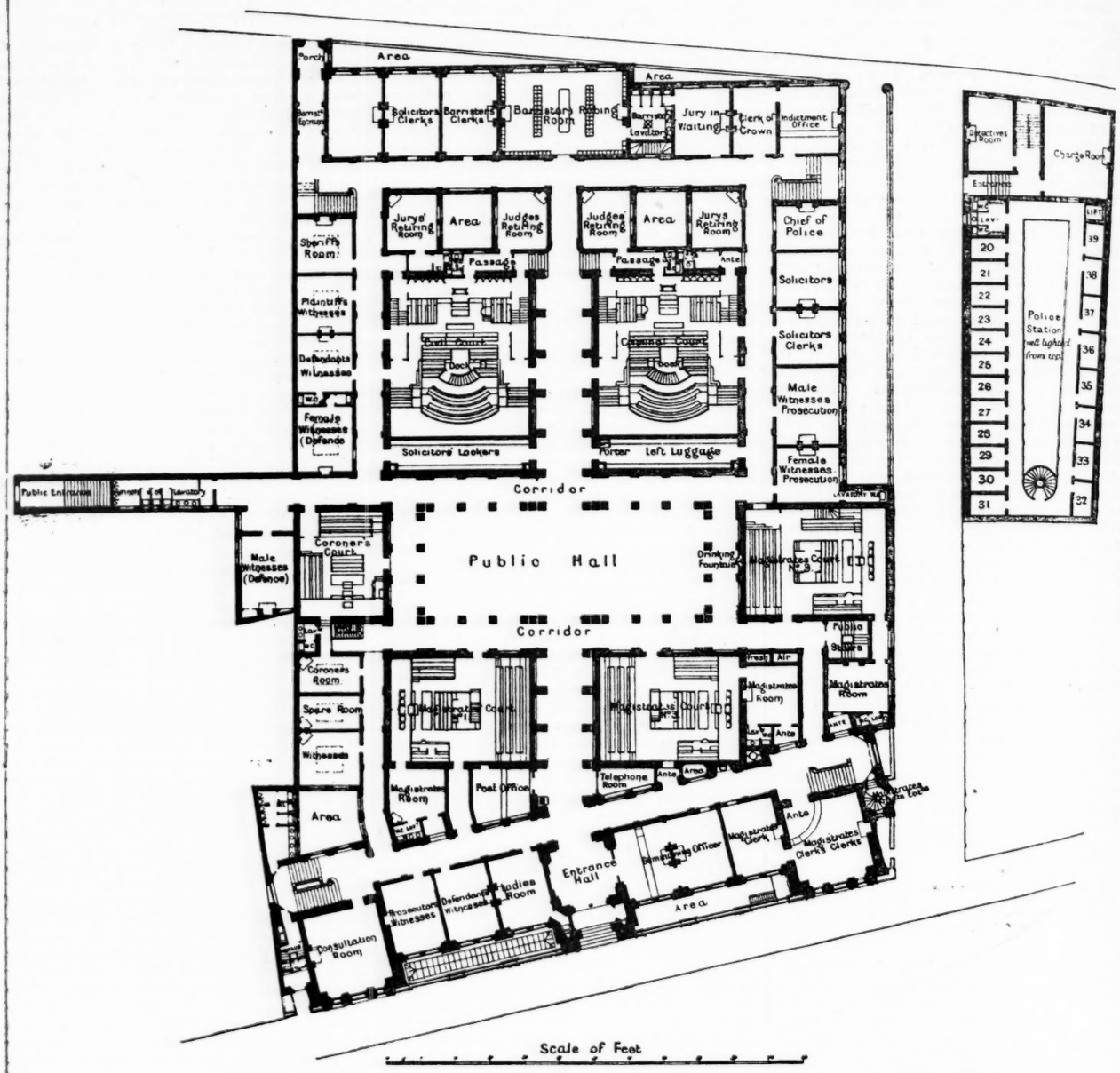
The address delivered before the Chamber of Commerce, Glasgow, by Mr. William Birkmyre under the above title, contains some shrewd observations on a subject in regard to which a great deal of misconception exists, viz., the effect of the present depreciation of the silver currency on Indian trade. Mr. Birkmyre combats the idea that it is prejudicial to borrow in gold while the revenues of India are earned in silver, and he goes so far as to assert that even if India had no currency at all it would be still safe to borrow in gold for revenue-producing works. There is little doubt but that he is right in his assertion as regards the actual benefit to the Indian producer, but the practicability of the remedy which he declares the Indian Government has in its hands for overcoming the loss which it now sustains by a depreciated currency is, to say the least, questionable if not impossible; and that is, that if the worst comes to the worst, the Government of India might revert to the ancient method of taking a proportion of the produce of the land as rent, and send that produce to Europe for sale, and thus place themselves in funds for discharging their gold obligations without requiring a single rupee; and still further, that it is equally competent for the Government to stop the sale of their council bills, to buy Indian produce with the rupees deposited in the Indian treasuries, and, in order to discharge their gold obligations in London, send that produce to Europe for sale.

No one with the least practical acquaintance with what the collection of rent in kind means in the present day, let alone the incongruity involved in a Government assuming the functions of the merchant, would have hazarded such an assertion. But he is more correct when he observes that a great deal of the present depression of British trade might be remedied by multiplying the means of communication in India, so as to give those places which are now shut out from the ports easy and cheap access to them, though his recommendations lean too exclusively to railways. The instance he quotes of the coal-fields, virgin forests, and wheat-producing plains of the Central Provinces is just one where it is by no means clear that a railway would be the only or the preferable means of communication, or whether part of the large sums which must be expended on its construction would not be more profitably laid out and go further in improving the already partially available navigation by the river Godavery to the coast. There are, of course, many localities where no navigable lines are possible and where the railway is a necessity, and the sooner such railways are made the better, especially where, as is stated, there are actually no means of carrying off the surplus produce to the markets of the world. If, with the present restricted access to the ports, the trade of India has increased to the extent indicated by Mr. Birkmyre, so that the total tonnage required for its foreign trade increased by 2¼ million tons in ten years, the progress that will be made when India is as well served with communication as England is beyond calculation. His final suggestion is certainly in the right direction, that with improved and higher cultivation the present produce of the soil may be increased and the Indian average of eleven bushels of wheat to the acre might be doubled, if not raised to at least that of England, which approximates twenty-seven to thirty bushels. We quite endorse the concluding remarks of Mr. Birkmyre's address that India is a very misunderstood country, and that the future of England is much more connected with India than with many of the questions nearer home which are now absorbing public attention.

* The Revival of Trade by the Development of India. By William Birkmyre, of Calcutta and Port Glasgow. Published by the City of Glasgow Chamber of Commerce.

Portsmouth.—New buildings for the Prudential Insurance Company have just been commenced at Portsmouth. Mr. A. Waterhouse, R.A., is the architect, and Messrs. Stephens, Bastow, & Co., of Bristol and London, are the contractors.

Appointment of Surveyor.—Mr. A. P. J. Cotterell, C.E., of Bristol, has been appointed Surveyor to the Horfield Local Board, near Bristol.



Birmingham Law Courts, Second Competition.—Plan of Design by Messrs. Bateman & Hunt.

Illustrations.

WINDOW IN THE NEW CITY OF LONDON SCHOOLS.

THIS illustration shows one of two east windows erected in the new City of London Schools, Thames Embankment. They are the gift of Miss E. Alston, sister of the Rev. Herbert Alston, Rector of Little Thurlow, Newmarket. The one we illustrate is dedicated to the memory of G. F. W. Mortimer, D.D., formerly head master of these schools. The windows contain representative figures of English and Greek poets. Messrs. Heaton, Butler, & Bayne, of Garrick-street, London, designed and executed the work.

BIRMINGHAM LAW COURTS: SECOND COMPETITION.

DESIGN BY MESSRS. BATEMAN AND HUNT.

WE give the perspective view of this design, which was placed second by the assessor. The original drawing is in rather delicate pencil outline, which will not photograph very clearly; but the designers, to whom we referred the matter, expressed themselves satisfied with the representation of their drawing, and accordingly we give it, as it is only a choice between this and not illustrating it at all, and there is a good deal that is very graceful in the treatment of the design. The treatment of the central hall in the plan, which we append, has also a character of its own, and would have been effective in execution.

PLACES VISITED ON THE CAMBRIAN ARCHÆOLOGICAL ASSOCIATION EXCURSION.

WE give some small views, reproduced from photographs, of Margam Abbey and Oystermouth Castle, which were among the places of interest visited by the Cambrian Archæological Association during their annual excursion this week. Some account of Margam Abbey will be found in the portion of the report of the excursion given in another column, and which will be continued.

A WAREHOUSE FAÇADE.

THIS design, by Mr. W. Stirling, was hung in the architectural room at the Royal Academy Exhibition of this year. The original is a coloured elevation, designed, as its author says, "as a study of what is probably the typical building of our times." The materials indicated are stone and red brick, and what decoration is not in sculpture is intended to be in mosaic. The design, which we commented on in our review of the Academy architectural drawings, shows a considerable amount of spirit and originality.

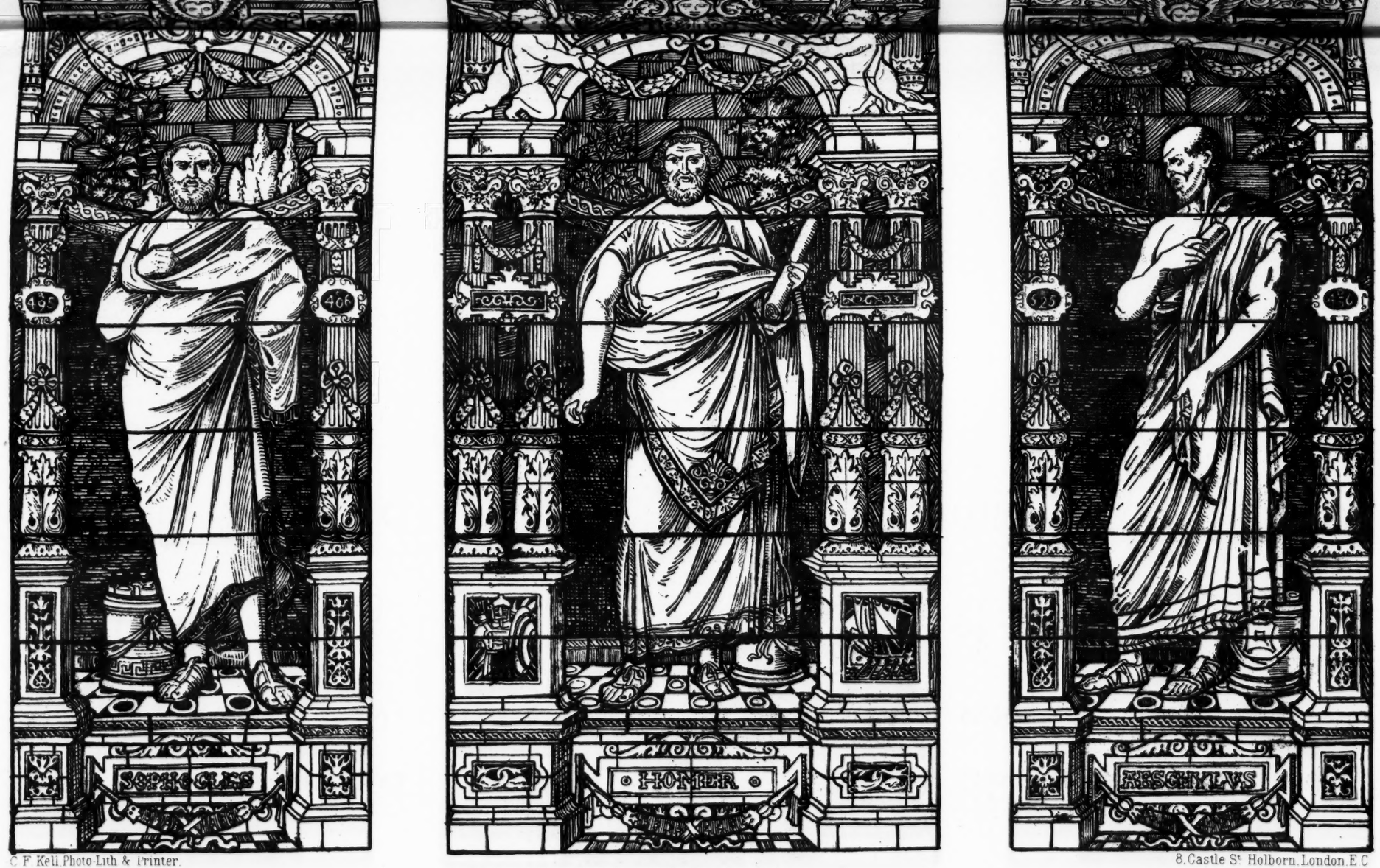
SKETCHES ON THE ARCHITECTURAL ASSOCIATION EXCURSION.

WE give sketches of three of the places visited by the Architectural Association in their recent excursion in Kent: Malling Abbey and Birling Church, the tower of the latter of which was referred to in our report as one of the most picturesque objects which the party came across in their route; and the courtyard of Ightham Mote House, described in the first portion of the report, pp. 264–5.

Obituary.—We regret to hear of the death of Mr. Matthew T. Shaw (senior partner in the firm of Matt. T. Shaw & Co.), which took place suddenly on the 14th instant. The surviving partners of the firm (Messrs. Harry T. Shaw & C. Chittick) have issued a circular announcing that the business will be continued by them in all respects as hitherto.

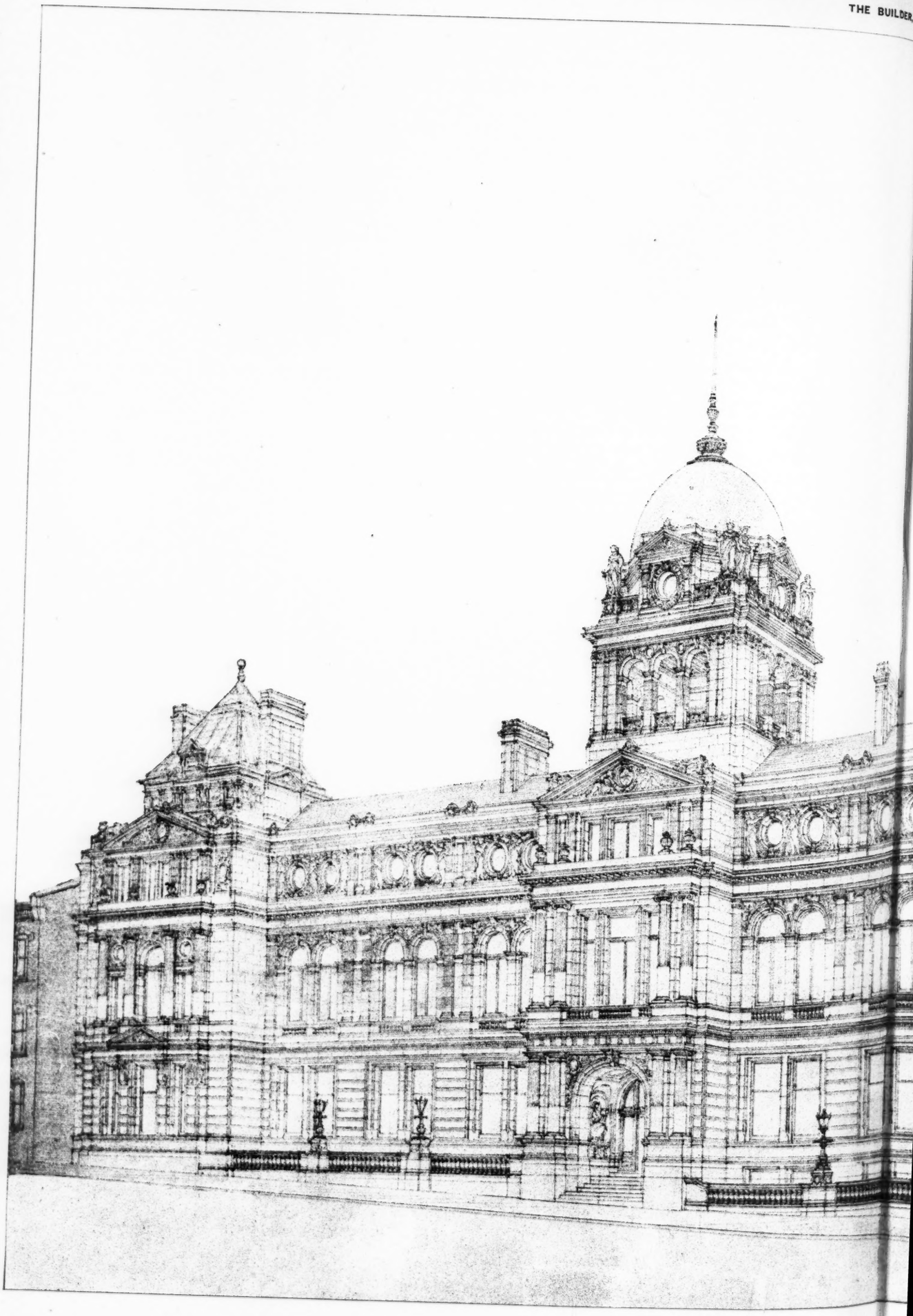
One of a series of windows designed and executed for the new City of London Schools by Messrs. Heaton Butler and Bayne, London.

illustrative of Art & Science



C F Kell Photo-Lith & Printer.

8 Castle St Holborn London E C

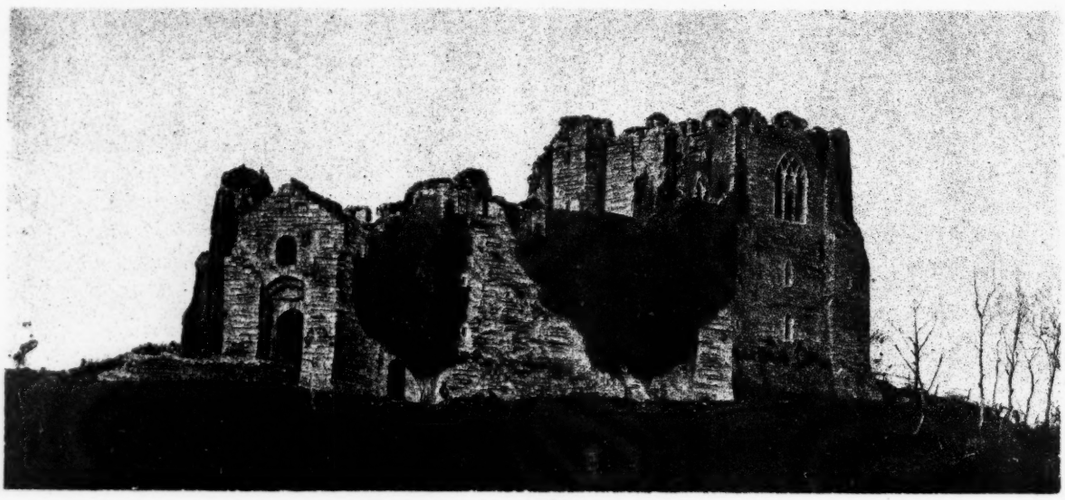


BIRMINGHAM LAW COURTS, (SECOND COMPETI

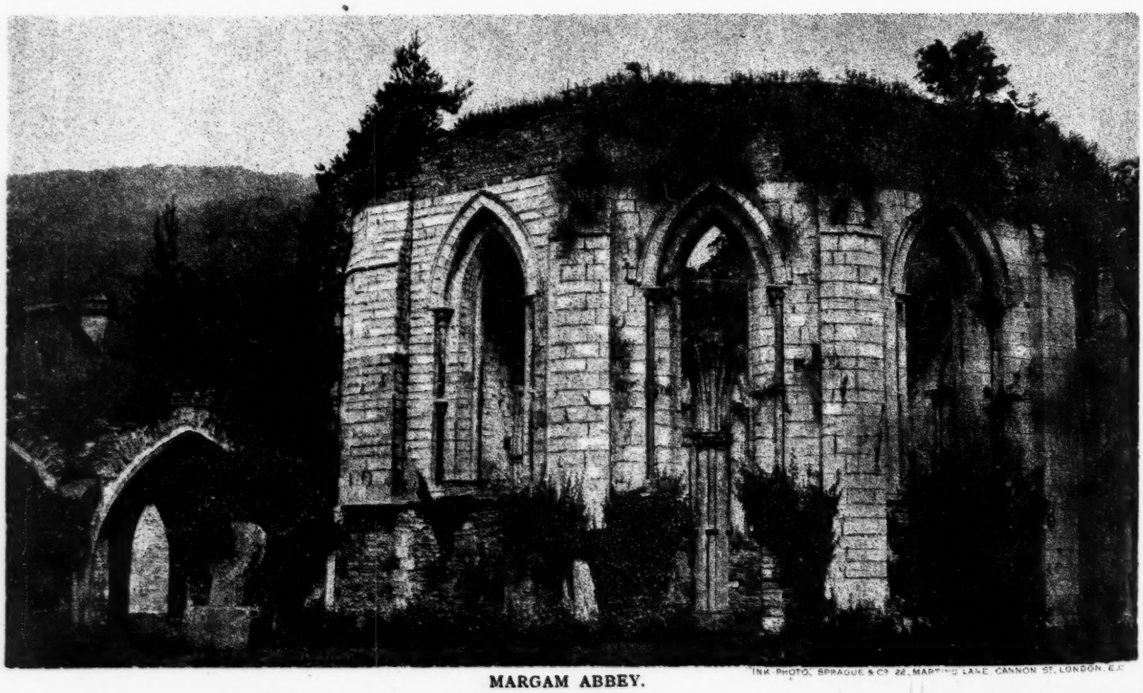
"INK-PHOTO," SPRAGUE & Co 22, MARTINS LANE, CANNON ST, LONDON, E.C.

COMPETITION.)—DESIGN BY MESSRS. BATEMAN & HUNT.

OYSTERMOUTH CASTLE, INTERIOR.

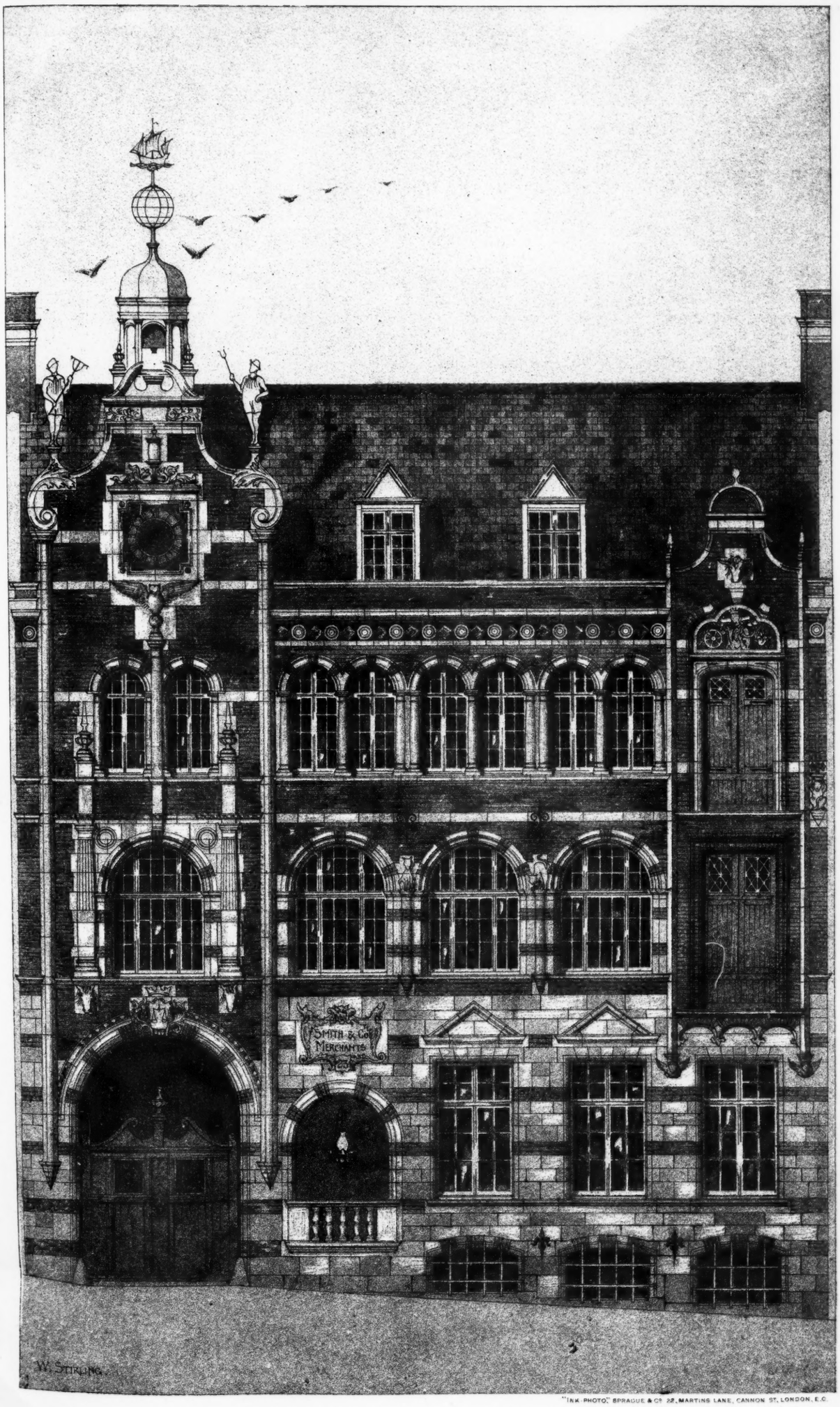


OYSTERMOUTH CASTLE, EXTERIOR.



MARGAM ABBEY.

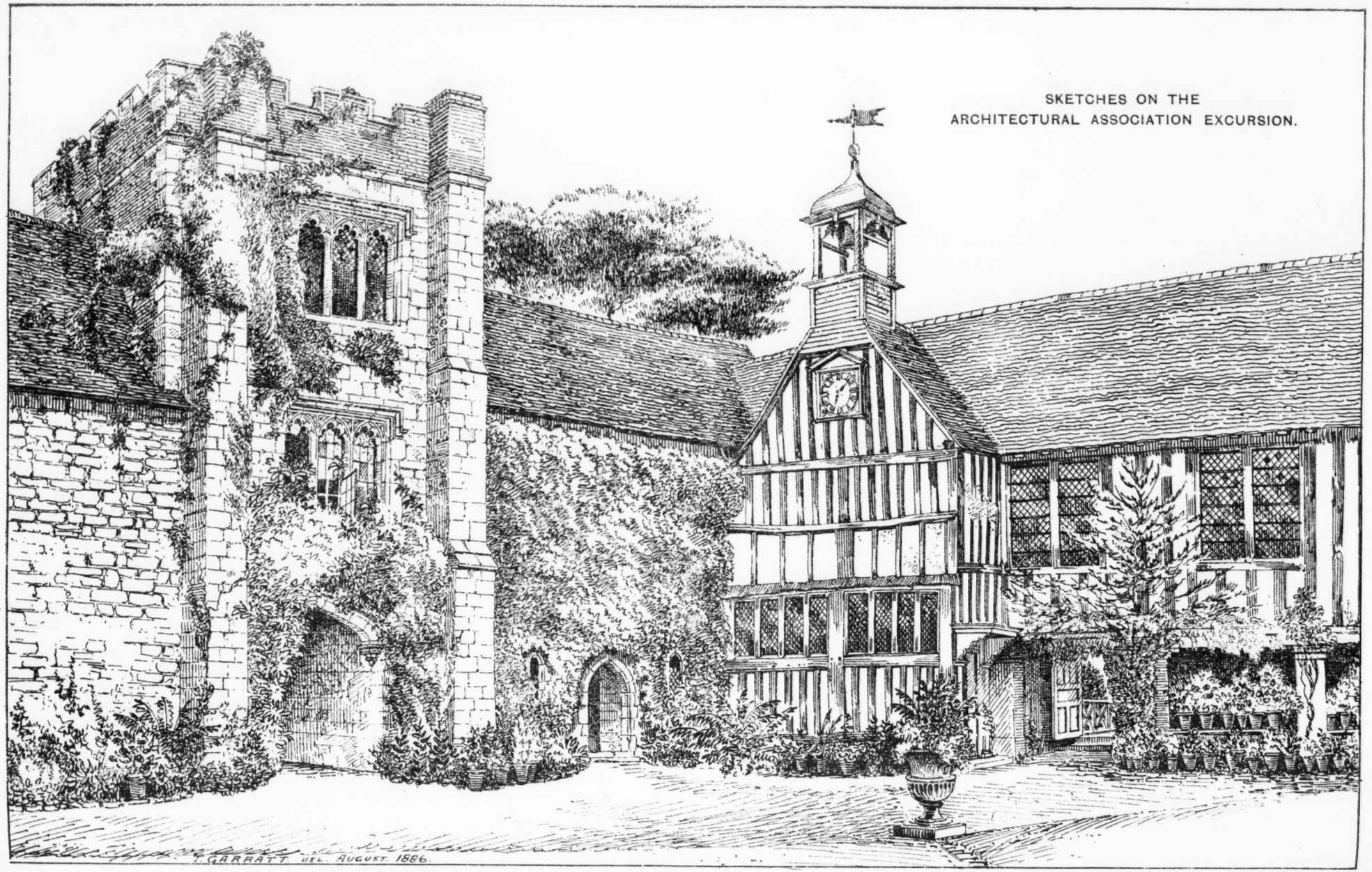
SOME PLACES VISITED ON THE CAMBRIAN ARCHÆOLOGICAL SOCIETY'S EXCURSION.



"INK-PHOTO," SPRAGUE & Co 22, MARTINS LANE, CANNON ST, LONDON, E.C.

A WAREHOUSE FACADE.—Designed by Mr. W. Stirling.

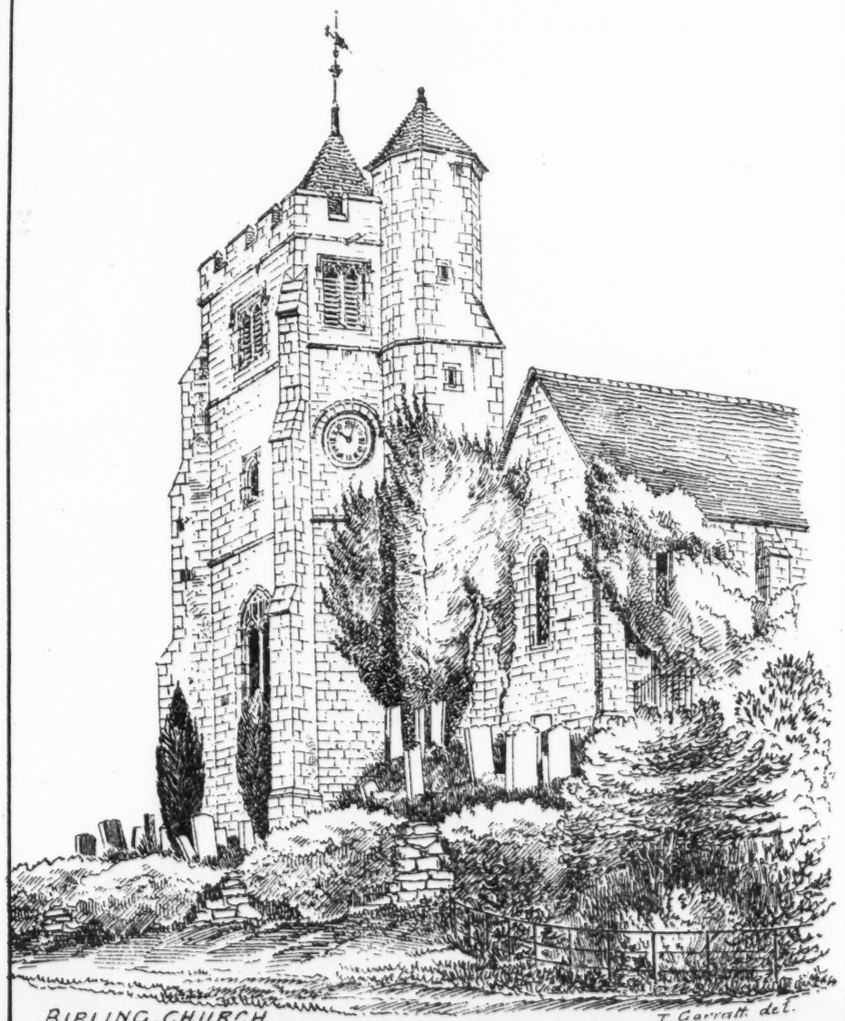
SKETCHES ON THE
ARCHITECTURAL ASSOCIATION EXCURSION.



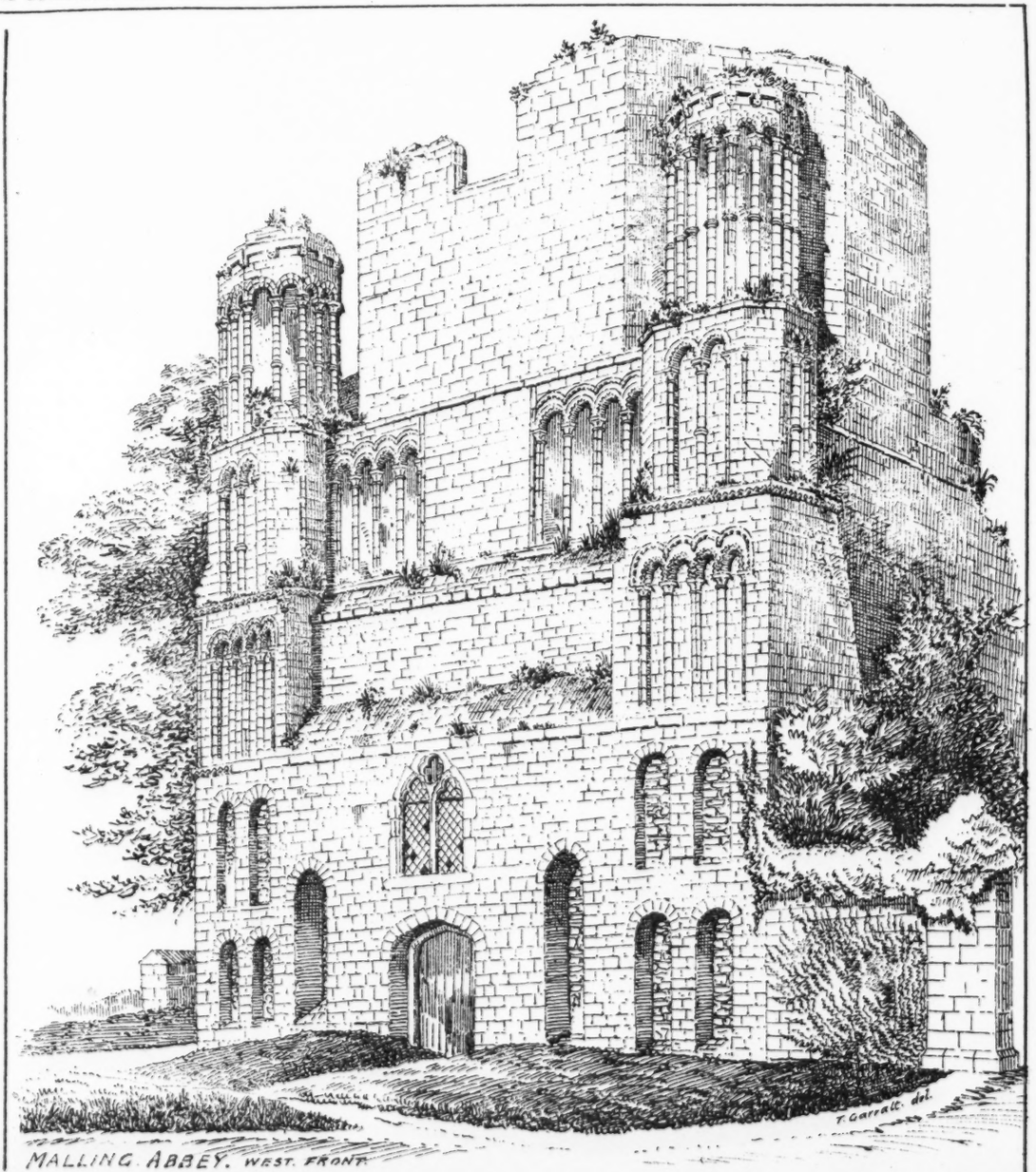
IGHTHAM MOTE HOUSE, KENT.—NORTH-WEST ANGLE OF QUADRANGLE.

C. F. NELL, PHOTO-LITHO, 8, FURNIVAL ST. HOLBORN, E.C.

SKETCHES ON THE
ARCHITECTURAL ASSOCIATION EXCURSION.

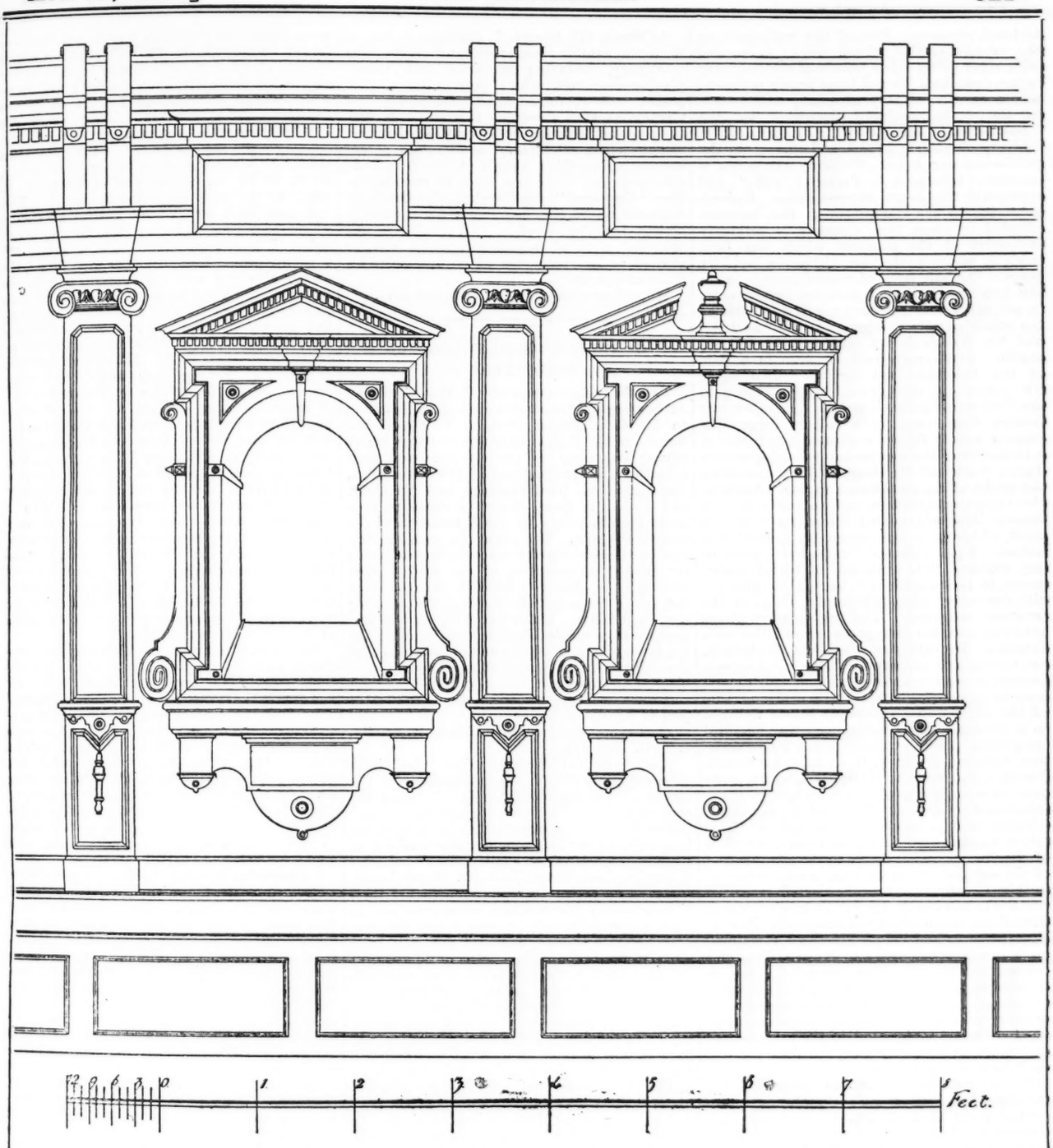


BIRLING CHURCH. T. Garratt. del.



MALLING ABBEY. WEST FRONT. T. Garratt. del.

C.F.KELL, PHOTO-LITHO, 8, FURNIVAL ST HOLBORN, E.C.



Wood Panelling in Convocation Hall, Oxford.—Measured and Drawn by Mr. S. J. May.

PANELLING, CONVOCATION HALL, OXFORD.

The Convocation Hall forms a basement story to that part of the Bodleian Library which was built in 1640.

The Hall is used on all occasions when it is necessary that the votes of members of Convocation should be registered, such as in the framing of statutes, and for conferring degrees upon those who have satisfied the examiners in the public examination.

The oak wall panelling is very interesting, Jacobean in character, with a very singular perspective effect in the panels.

S. J. May.

New Reredos, Tilstock, Salop. — An addition has been made to the church here by the erection of a reredos, which has been executed by Messrs. Jones & Willis, of Birmingham and London. The reredos is of oak, and contains five zinc decorated panels, enriched with texts and sacred monograms.

NOTES AT THE LIVERPOOL EXHIBITION.

The general aspect of this Exhibition, now that it is completely arranged and catalogued, is so strikingly different from that presented at the time of the notice in our issue of the 22nd of May last, that some further notes may prove interesting to our readers. Passing over the strictly naval portion of the display, which we have already sufficiently described, merely noting that it has been greatly increased, both in the number and interest of its several parts, and more especially by the introduction of many curious and picturesque models of ancient,—and in some instances one is tempted to say prehistoric,—ships and boats, sent by the Swedish Government, we will confine our observations to those sections which more immediately relate to the pursuits of the architect, engineer, operative, and artist.

The walls of the entrance-hall and grand staircase are covered with a series of six painted tile panels by Messrs. Doulton & Co. representing incidents in the lives of "industrial heroes." The subjects are:—"Faraday in his Laboratory," "Daguerre and Niepce conducting some Experiments in Photography," "Benjamin Franklin working at the Printing Press," "Arkwright at his Spinning Jenny," and "Robert Peel making his first Experiments in Calico Printing," and "Caxton at his Press." Besides these there are four painted tile panels representing processes of pottery-manufacture, viz., (1) "Working the Press in Tile-making," (2) "Throwing on the Wheel," (3) "Lathing," and (4) "Kiln-setting." These panels form very effective pieces of wall-decoration, but some of them are spoilt by the prominence of the joints of the tiles. This is especially the case in the one containing the figure of Faraday, whose black coat shows up the joints of the tiles with disagreeable prominence. Messrs. Doulton's large "trophy" of faïence and stoneware in the centre of the main avenue, although built-up of and containing much that has been seen elsewhere, may, with its four supplementary stands or alcoves at the angles, be commended to visitors as affording a varied representation of the capabilities and wide application of pottery in the present day, whether for utilitarian, ornamental, or archi-

tectural purposes. Part of the wall-space on the exterior of the central trophy is covered with other painted tile panels of the character before described. Two of these panels represent scenes on the Mersey especially appropriate to the main subject illustrated by the "Shipperies" Exhibition. One is entitled "Liverpool,—Past: 1838," and represents the paddle-steamer *Royal William;* the other is entitled "Liverpool, — Present: 1886," and represents the large screw-steamer *Umbria,* belonging to the Cunard line. The contrast afforded by these two steamers is strikingly indicative of the progress which has been made in steam navigation within the last fifty years. The only point of resemblance between the two vessels is that each has two funnels; in all other respects they are as dissimilar as the primitive railway locomotive, the "Rocket," and Mr. Webb's latest three-cylinder express engine, which may both be seen in a part of the Exhibition not far off. Two other tile panels on this central trophy belong to the "industrial heroes" series. One represents George Stephenson at a colliery forge, discussing with a fellow workman the model of a locomotive; the companion panel represents James Watt and Matthew Boulton discussing the model of the condensing engine. Amongst the things exhibited in and on the trophy is Messrs Doulton's patent "Burslem" stained glass, which we do not remember to have seen before. Upon coloured "cathedral" glass of any required tint, ornament of varied design seems to be painted and burned in, giving a rich decorative effect where the design of the ornament is suitable. The most effective pieces exhibited are the two panes nearest the main entrance. The other panes, having floral designs, are too realistic in character. This seems to be a process of window decoration from which much may be expected, given suitable designs. One of the angle-spaces or stands before referred to is devoted to the exhibition of architectural terra-cotta. These exhibits include a new doorway, designed by Mr. T. G. Jackson, for Messrs. Powell's glassworks at Whitefriars, which, however, as actually erected, has a sculptured frieze interposed between the lintel and the pediment, illustrative of processes in glass-making. This frieze, which is absent from the Liverpool *replica* of the doorway, adds much to the effectiveness of the composition as a whole. Another exhibit in this department is a well-executed traceried window in terra-cotta for St. Andrew's Church, Streatham, late in style, and designed by Messrs. Ernest George and Peto. The three remaining angle pavilions belonging to Messrs. Doulton's central exhibit are thus occupied,—one is devoted to sanitary house fittings of all kinds in action; another contains an assortment of sanitary stoneware for drainage purposes, while the fourth is appropriated to the exhibition of stoneware and other pottery for domestic and manufacturing purposes.

We pass on to the annexe containing the machinery in motion, which in May was in a perfect state of confusion, but is now in full operation. This is a very important section of the exhibition, and occupies three large galleries on the south-east wing of the building, measuring in the aggregate 270 ft. by 200 ft. more.

The great bulk of the machinery is driven by a very fine horizontal compound engine, by Galloway & Sons, Manchester, fed by three large boilers, representing an aggregate power of 1,000 horse. In this section one of the most noticeable exhibits (Stand 855) is a large improved horizontal fixed engine, by Robey & Co., of Lincoln, designed especially for countries where transport is difficult, and nearly the whole of which can be taken into small pieces, weighing not more than about 120 lb. each, so as to enable the parts to be carried on a mule's back.

Mr. John Anderson, of Newcastle-upon-Tyne, saw-mill engineer, has (Stand 788) an automatic dovetailing and woodworking machine in motion, applicable, it is said, to both heavy and light work, in mortising, tenoning, trenching, dovetailing, &c.

Messrs. Sagar & Co. (Stand 794), of Halifax, exhibit planing, band-saw, and other woodworking machines. These are all solidly and well made, and constitute a very serviceable workshop plant for a builder or joiner.

Mr. Edward Shaw (Stand 806), of Bristol, exhibits a sack hoist applying Professor Hele Shaw's patent sphere and roller mechanism. It is stated that this hoist is self-sustaining, that it can be worked at varying speeds, that it is easily controllable, and cannot over-wind.

At Stand 811 Messrs. T. Robinson & Son, of Rochdale, exhibit some excellent wood-working machinery, including mortising and panel-planing machines, which possess some good points. A combined hand and power feed planing-machine shown at this stand is very compact and well finished, as are all the other machines here exhibited. Armstrong's patent dovetailing machine, shown by this firm, is an admirable and ingenious piece of mechanism. The "Universal" wood-worker, also shown by these exhibitors, combines means for mortising, boring, tenoning, sawing, and planing in one compact piece of machinery, which can be worked at by three men at once engaged on different operations.

We will continue these notes in our next.

CAMBRIAN ARCHÆOLOGICAL ASSOCIATION.

The forty-first congress of the Cambrian Archæological Association opened in Swansea, on Monday, August 23rd, at 8·30 p.m., the theatre of the Royal Institution of South Wales having been filled by the members and their friends. The Ex-President of the Association, the Right Hon. Lord Tredegar, took the chair, and Mr. J. T. Rees, Mayor of Swansea, in a short speech, welcomed the Association to the ancient borough. The chairman most heartily thanked his worship and the other Swansea men for their kind reception of the Society that evening. As regarded himself, he said that last year when he had the pleasure of welcoming the Cambrians in his own country he had prepared a very pretty little speech to conclude the proceedings, but he was then informed that it would not be required until he had completed his year of office, and now that the right time was come he regretted to say that the greater part of his speech had evaporated, so he would at once make way for the President-Elect, Mr. J. T. D. Llewelyn.

The President having taken the chair, proceeded to deliver his addresss:—In the course of his remarks he said,—I thank the members of the Cambrian Archæological Association for the high honour they have done me in appointing me to the honourable position of President. A large and industrious local committee has been formed with Mr. Walter Lewis, C.E., for its active secretary, and I trust that, if favoured by fair weather, we may be able to carry out satisfactorily to your minds the programme with copies of which you will have already been supplied. The antiquities of Swansea have already received your attention at a previous meeting in the year 1861; but, for two reasons, another meeting on an already reconnoitred locality may be held with advantage. In the first place, a new generation will have sprung up after an interval of twenty-five years, to whom this meeting will come fresh and full of interest; and secondly, the information acquired by those who were here in 1861 will not only bear refreshing, but very possibly be the germ from which more matured opinions and views will have been developed, and if such find expression in the debates and transactions of Archæologia Cambrensis, it will be to the advantage and benefit of the history which it is our special point and object to clear up and emphasise for those who come after us. Truly, it is for this that the Cambrian Archæological Association exists. Names and legends may, if taken alone, be of little real value, but they are suggestive to many. I will record a legend of my own place given me by my father, as received by him from the old people of the neighbourhood. Penllergare (Pen-lle'r gaer) is the chief camp. Tradegar (Troed-y-gaer) is the foot of the camp (situate about three-quarters of a mile to the north). This would indicate that these camps were facing southwards. The names are Welsh. One mile and a half to the south is Cadley, or the battle-field. A well near here is called Fynon Circonan, or Colcona, and the legend is that the Western tribes defeated at Cadley, after the death of their leader, who died from his wounds while drinking at the well, which still bears his name, fled in confusion towards the nearest fords of the Llwchwr river, which now separates Glamorganshire from Carmarthenshire, and were routed a second time on the plains of Carn Goch, or the red Carn, which took its name from the bloodshed which occurred here. Another locality in the immediate vicinity is Llwyn Cadwgan, and as we know that Cadwgan was king of Guhir or Gower, Cutgueli or Kidwelly, and Cantref Bichan, about A.D. 1066, it may be that he was implicated in the Battle of Cadley; and, if so, a date would be obtained for the suggestive names above mentioned. Many years ago I was present at, and superintended the, opening of the principal Carn on Carn Goch. It consisted of a mound of earth, 60 ft. or 70 ft. across, and 4 ft. or 5 ft. deep, so far as I can remember now. This had once been covered by a heap of stones, which had been removed for making roads before I can remember. On opening the earthen Carn a ring of stones was found, the centre of which was not concentric with the centre of the Carn itself. A number of cists were found, consisting of flat stones, charcoal, and cremated bones. Two flint instruments were found, one a rude knife and one an equally rude spear-head. Nine sepulchral urns or vases of rude pottery were found, ornamented by the impression on the undried clay of twisted thongs or rushes. One of these sepulchral urns then found I now present to the Museum here, while others were deposited with their history in the British Museum, in London. I merely give the story as exactly as possible as I received it from my father, and I daresay there are gentlemen here who will take a pleasure in shredding it into a score of fragments. I cannot conclude without a reference to the valuable addition to the records of the County of Glamorgan, in the publications of Mr. George T. Clark, of Talygarn, his valuable history "The Land of Morgan," and express a hope he may live long to give us a continuation of it up to more recent times.

On Tuesday morning, the Members and Associates, having assembled at the Royal Institution, started in carriages, about 9·30, for Margam Abbey, the seat of Mr. C. R. M. Talbot, They drove seven dreary miles along a road constructed out of dust and ashes, and lined with colliers' cottages. Having at length passed through the collier colony, they reached the pretty village of Bagland, with its handsome new church, and in due time came in sight of the woods of Margam Park. This differs somewhat from one's notion of what a park ought to be; it is a steep hill-side, covered with boulder stones and gnarled oak trees.

On reaching Margam Abbey, the party were welcomed by Mr. Llewelyn, in the absence of the proprietor, Mr. Talbot. The Association were first taken to see the parish church, which is formed out of the nave of the ancient abbey. How much of this is original work, and how much comparatively modern restoration, was discussed. It would seem that the lower portion of the west end is certainly original Norman work, and the nave arches are seemingly the work of the original founders,—the rest seems modern; but the old abbey church when in its glory was the growth of ages, for we can trace in its ruins Late Norman, Early English, and Decorated work. In a chapel are several monuments to the Mansel family. Among others is one in which a Lady Elizabeth Mansel, daughter of Henry, Lord Manchester, rests her feet on the paternal crest, a griffin's head. This seems somewhat unusual, for we have always been taught that ladies were not entitled to bear crests.

The members having assembled within the walls of the ruined chapter-house (see illustration in this number), an exhaustive paper was read by Mr. S. C. Gamwell on the history of the ancient Cistercian foundation. According to Dugdale, Robert, Earl of Gloucester, Henry Beauclerc's bastard son, laid the foundation of the building about 1147. The earl had married a daughter of FitzHamon, conqueror of Glamorgan, and succeeded his father-in-law in the lordship. The edifice seems to have been rapidly completed; in 1188 Giraldus Cambrensis alludes to it as "The noble Cistercian monastery of Margam." At the dissolution of religious houses under Henry VIII., the abbey revenue was assessed at 181*l.* 7s. 4d., and the domain purchased by Sir Rice Mansel, of Oxwich. For several generations the old monastic building was the chief seat of this ancient family. During his "Progress" in 1684, the Duke of Beaufort, Lord President of Wales, was welcomed at Margam with the greatest loyalty, and conducted "to the summer banqueting house, built after the Italian, where regular simetric, excellent sculpture, delicate graving, and an infinitee of good Dutch and other painting, make a

lustre not to be imagined; its pavements are of marble, black, red, mixed, and white, chiefly the product of quarries belonging to the owner in his lands in the county; nothing was spared that the noble place could afford of diversion. Here his Grace was entertained with the pastime of seeing a brace of bucks run down by three footmen, which were afterwards led into Margam antecourt alive, and there judged fit for the table, before the huntsman gave the fatal stroke with his semiter." We trust that the bucks were the victims of this pastime, but for all that appears it may have been the footmen; at all events, whether it was the bucks or the footmen who furnished the feast, "many came, eat, and drank, as their appetites led them." The male line of Mansels of Margam became extinct in 1750, when the property passed by marriage to the Talbots, in whose possession it still remains. The old home of the Cistercians was pulled down about 1780. After luncheon, which was served in the orangery, and a glance at the pictures in the modern mansion, the party retraced their steps to the sister abbey. Down in the marsh land, among unlovely surroundings, lie the remains of Nêdd, or Neath Abbey; but in the days of its pride, we are told, the hills, which are now bare and brown (all vegetation having been destroyed by the vapour from the copper-works) were clad to their summits with wood, the stream abounded with fish, and the marsh-land with game of all sorts; these have now been replaced by colliery works. According to Leland, Neath was the finest abbey in all Wales. It was founded by one De Granvill, a knight who followed Fitz Hamon's fortunes, about 1129. It is recorded that Lalys was his architect,—"a man greatly cunning in building;" he also designed Margam. Edward II., of unlucky memory, took sanctuary in this holy house. Little, however, remains of his date. The proprietor, Lord Dynevor, had kindly laid bare some flooring near the high altar for the benefit of the Association. The domestic buildings of the monastery seem to have been reconstructed after the Dissolution, and now appear in the guise of ruined Tudor mansion. The members reached Swansea at 8·30, and, after a hurried dinner, hastened to the Theatre for their evening meeting. We will resume our notes of the meeting in our next.

FOG PONDS.

Many of the archaic methods which met the requirements of ruder ages have, from their simplicity, efficiency, and economy, continued in use amidst the improved conveniencies of modern science. Dependent as were the men of other days upon the phenomena of nature more directly than in our times, they found many ways of increasing the benefits thereby obtained, which are still in use and likely to be so until the end of time.

Water supply for flocks pastured on wide chalk downs would appear a peculiar difficulty; far from streams, high above water-bearing strata, too remote from any publicly-organised system; nevertheless, the fog-pond has supplied the sheep farmers of many a dry down with necessary water.

Gilbert White, writing in 1776, remarks,—"To a thinking mind few phenomena are more strange than the state of little ponds on the summits of chalk-hills, many of which are never dry in the most trying droughts of summer. We have many such little round ponds in this district, and one in particular on our sheep-down, 300 ft. above my house, which though never above 3 ft. deep in the middle, and not more than 30 ft. in diameter, yet never is known to fail, though it affords drink for 300 or 400 sheep, and for at least twenty head of large cattle beside."

The simple operation of making a fog-pond, as noticed on the downs near Worthing in the summer of 1881, is as follows:—The selected spot, on the slope (in this case almost at the summit) of the downs is unturfed, the turf removed, and the chalk dug out to form a saucer-shaped depression, the surplus chalk being deposited on the lower side, forming an embankment. Water is then thrown on the bottom, and a horse, harnessed to a small implement having several wheels something like those of a clod-crusher, is walked round and round, thereby working the whole of the invert into a slurry. This operation is continued for three days, the horse and wheels going their monotonous round deep in the white mud, which, when sufficiently worked, is dressed to an approved segmental shape and forms a retentive basin, not liable to crack, like a clay lining during dry weather.

The supply is, to some extent, assisted by storm water running down over the saturated turf, but its chief source is atmospheric moisture, which condenses in quantities marvellous to those who have not noticed the fact. The before-named naturalist observes:—"Hence we see that the air, when loaded with fogs and vapours, and even with copious dews, can alone advance a copious and never-failing resource."

The working of the chalky bottom was formerly done by the feet alone, of horses or men, and the whole process is still carried out in a traditionary manner by the local peasantry of those districts where fog-ponds are used.

THE ARCHITECTURAL ASSOCIATION'S VISIT TO OXFORD.

The Architectural Association on Saturday, the 21st inst., made a visit to Oxford. Leaving London by the nine a.m. train from Paddington, the party arrived at eleven a.m. at Oxford, and were met by Mr. E. G. Bruton. A member of the party sends the following notes of the excursion:—

"The first building visited was Merton College; here Mr. Bruton gave a short description of the general arrangement of the colleges. The earliest building erected was always the kitchen, the only record of the members of the college at this early date being the dinner bills. Merton was selected as the oldest type of college, the chapel, which was also the parish church of St. John, having been taken as the type of all the other chapels in Oxford. The plan consists of a choir, tower, and transepts: the nave never having been built, the choir forms the chapel, and the tower and transepts the ante-chapel. The core of the walls of the chapel is thirteenth-century, with fourteenth-century facing; the tower is pure thirteenth-century work, the transepts fourteenth-century. The chapel has been decorated by Mr. Pullan. The arrangement of an open gallery for the ringing-chamber has not been found a complete success. The door to the north transept has some splendid thirteenth-century iron work. The college was founded by Walter de Merton in Surrey, 1264, and removed to Oxford 1274. The buildings date from 1277. Mob Quod, the oldest part of the college, contains the library on one side. On account of its size, Anthony Wood said that the builder of this must have anticipated the introduction of printing, but it is probable that the original purpose of the building was for a dormitory, and the spaces occupied by the books were formerly cubicles. The muniment-room, which occupies another side of the Quod, has a singular stone roof with stone principals; and this building contained all the manuscripts till the library was adapted by Whiston in 1503, whose crest is plentifully displayed on the ceiling. The other quadrangle is dated 1660. The sacristy, now being restored by Mr. Jackson, is a fourteenth-century building with a doorway leading into the choir. The gardens include part of the city walls of the time of Henry III. The fields outside the walls, called Fishpond fields, were given to Christchurch by Lady Montacute. It is related that the Fellows of Merton, being anxious to cut a doorway through these walls, went to Woodstock, where Henry III. was staying, to obtain his sanction; but this request was so curiously couched in Latin that the King was unable to comprehend it, and he recommended the Fellows to return home and stay there till they made up their minds what they did want. The entrance gateway is vaulted, with the signs of the zodiac on the bosses of the groining.

From Merton the party proceeded down Logic-lane to the New Examination Schools, designed by Mr. Jackson, who met the members and conducted them over the building. The general plan of the building is a large entrance-hall with rooms on the ground-floor for *viva voce* examination ranged round a quadrangle, the fourth side of which is as yet unfinished. The angles of the building are formed into lobbies, with marble pillars supporting the floor, the design of which is all varied. The marbles used are Carrara for the plinths, breccia and Cipolini for the shafts, and statuary for the capitals. Mr. Jackson explained that while adopting the English Renaissance he did not use the style of carving which was found in the old work. The staircase has a carved parapet of alabaster, selected so as to have as few veins as possible, the panels being inlaid with antique African marble of beautifully varied vein and colour, which Mr. Jackson had obtained from a mason's yard near the baths of Caracalla in Rome. The hand-rail and string-course are Rosso antico. The general effect of the staircase is extremely good; the walls are lined with Cipolini marble slabs, fixed with bronze clips. The two columns of this marble were the first specimens brought to England from the recently-discovered quarries. The rooms on the first floor are used principally for written examinations, and are L and T shaped. These forms were adopted as giving the Examiners, who have raised seats, a better control over the students than the ordinary parallelogram shape. The tables used by the students are light movable deal tables. The Examiners' desks are the old ones from the original schools. The largest desk was designed by Sir Christopher Wren, and besides these desks Mr. Jackson has rescued several interesting pieces of Jacobean woodwork from obscurity and decay and worked them in. The ceilings are boldly ornamented with moulded and modelled plaster, with wooden ornamental trusses. The stone used for the interior is Caen; the exterior, Clipsham, which is a shelly oolite, which it is hoped will weather better than the local stone, of which so many deplorable specimens exist in Oxford.

The party after examining these interesting new buildings proceeded, under Mr. Jackson's guidance, to Trinity College (founded by Sir Thomas Pope, the Keeper of Queen Elizabeth, at Hatfield, in 1554. The present buildings date from 1618–20. They show how fondly Oxford clung to the Gothic style. A new block of buildings has just been finished containing lecture, reading, and living rooms from Mr. Jackson's designs. The chapel was designed by Dean Aldrich, probably assisted by Sir Christopher Wren. The interior is fitted with cedar, and decorated with carving by Grinling Gibbons. The monument to Sir Thomas Pope, a fine recumbent figure, occupies a curious cupboard with sash windows on the north side of the altar; a corresponding enclosure, also with sash windows with bevelled glass, being provided for the Warden's family. The garden quadrangle was designed by Sir Christopher Wren, who built the north side 1667, the south 1728, and never completed it. The entrance-gates, with massive stone piers, curved on plan on the garden side, form a very effective piece of garden architecture.

The next building visited was Wadham College. The interest in this building was pointed out in the fact that the original structure was completed and had never been added to. The College was founded in 1613, by Nicholas Wadham, and the buildings are of the same date, one curious feature being the chapel, which is very good Perpendicular Gothic, while all the other parts of the building are Early Renaissance. Mr. Jackson quoted from the old records some examples of prices for the various work. The tracery windows of the chapel cost 6*l.* each; the hall windows, 3*l.* 18s.; the statues in the niches over the entrance of the founder and his wife, 3*l.* each; gutter stones, 16d. per foot; Cornish, 2d. per foot; gurgoyle stone, 4d.; tunnel stones for the chimneys, 14d.; the stained glass in the east window, the kilns for firing which were erected in the College grounds, 100*l.* The chapel, which was restored by Blore (who played sad havoc with the Jacobean stalls to convert them to his style of Gothic) is now undergoing some structural repairs under the direction of Mr. Jackson. The chapel has a splendid Jacobean screen and some interesting old glass. The hall, in which the party were entertained at luncheon by Mr. Jackson, has a fine oak roof and some interesting portraits. The college plate was also examined, amongst which was the sugar-box presented by Sir Christopher Wren, who was a Fellow of Wadham.

The party then proceeded to the Bodleian Library. Mr. Jackson gave a short description of the original foundation by Humphrey, Duke of Gloucester, 1426, and the buildings erected for the University schools, 1578. Sir Thomas Bodley restored Duke Humphrey's library in 1610, Thomas Holt, of York, being architect.

He also provided the funds for the third story on the quadrangle, which was commenced 1613, three days after his death. The two lower stories were used for schools, but the library grew, and gradually occupied all the room, and after a long discussion whether to move the library or the schools, the latter course was adopted, and the new examination buildings were the result. The tower, which contains the five orders, was, when examined by Mr. Jackson, found to be entirely of Roman cement, carefully modelled, the stonework having decayed; it was found the decay was so deep that it was necessary to renew the whole. The Hall has a stone vault, with curious drop pendentives, called Wolsey's lanterns. At the further end are the two rooms in which the degrees are conferred. Passing up into the library, some curious MSS. were shown by the librarian; and then Mr. Bruton conducted the members to the roof of the Radcliffe Library for a general view of the city.

The next college visited was All Souls', which was founded by Archbishop Chichele, 1438. The hall was built in 1720 from the design of Dr. Clark. New College, founded by William of Wickham, 1379, was next visited; the chapel was restored by Sir Gilbert Scott, who did away with the sham vaulting of Wyatt and substituted an open hammer-beam roof, which raised the roof above the level of the stone parapet. The reredos is fifteenth-century work.

The Norman church of St. Peter's-in-the-East was glanced at; the crypt has a good carved cushion capital. Magdalen College, founded by William of Waynflete, 1456, was next visited, and then Christchurch College, founded by Henry VIII., 1532, on Wolsey's Cardinal College, founded 1525. The vaulted staircase, designed by Smith in the seventeenth century, is particularly good work for the period. The hall, the largest hall in Oxford, and the kitchen, which is an exact cube of 40 ft., were visited. The Cathedral, built 1120-1180, is extremely interesting. The carving of the Norman work has a very foreign look, especially the rose-window in the east end, restored by Sir G. Scott. The Chapter-house, restored by Bodley, is beautiful thirteenth-century work. After leaving the Cathedral, the party proceeded to Keble College, built 1868-78, from Mr. Butterfield's design. This concluded the excursion, the programme of which had been carefully arranged to give a comprehensive idea of the architecture of the city, commencing with the earliest and finishing with the latest college. The day was one of great interest, and the result fully justified the committee in the new departure of making whole-day excursions."

SHADWELL HOSPITAL COMPETITION.

Sir,—It appears to be wrongly supposed that we were commissioned to adjudicate upon the whole of the designs sent in competition for additions to the above institution, and we therefore shall be glad to be allowed to state that our advice was only asked in reference to the four designs selected by the Managers, viz., "Sunshine," "Thought," "Simplex," and the one marked with a circle. We have not seen the remaining designs.

We gave it as our opinion, that the design bearing the motto, "Sunshine," was the best of the four, and the Managers appear to have acted upon this advice.

We have thought it better to obtain the Managers' concurrence to our sending you this correction. Hence the delay.

H. Saxon Snell & Son.

No. 22, *Southampton-buildings, Chancery-lane, W.C.*
August 25, 1886.

*** If, as we are assured, a circular was sent to the competitors, informing them that the advice of a professional adjudicator would be taken on their plans, while in fact the Managers have only submitted four out of the whole number to the assessor, the authors of the others have a right to ask for an explanation of this way of treating them.

Mosaic in St. Bridget's Church, Wavertree.—Messrs. Salviati & Co. have just completed a large copy in mosaic of Leonardo da Vinci's "Last Supper," on the chancel wall of St. Bridget's Church at Wavertree, near Liverpool.

CHARGING FOR CLERKS' OVERTIME.

Sir,—Perhaps you, or some of your readers, will kindly inform me whether the following transaction is according to the usual professional custom, as to me it seems very much like obtaining money under false pretences.

In a certain light and air case, a surveyor was engaged for the plaintiffs. One day he brought down two assistants to make a survey and drawings of the properties over which the dispute arose. When the surveyor's bill came in (it amounted to over 100*l.*) the following item was included,—"To clerks' extra time, 10*l.*" To this no objection was taken, as the two assistants had worked from 1 p.m. on Wednesday till 6 a.m. on Thursday, with only one hour's rest, and had done an immense amount of work in the time.

The bill was paid, including this 10*l.* item, but it turns out that the surveyor pocketed this money paid for clerks' extra time, and did not pay one farthing for the overtime which he had made a special item of. It must be understood that besides the surveyor's professional fee for acting in the case, every expense incurred by him and his assistants, from beginning to end, was paid by the plaintiffs, who won the case.

Now if this be the usual professional custom, the sooner it is generally known the better, as then payors, whether plaintiffs or defendants, will probably take care that money paid by them reaches the parties for whom it is intended, and is not annexed by middle men.

In the case in question, it is more than probable that had it been known in time that the 10*l.* were not intended for the assistants for their overtime, the amount would have been disallowed.

T. S.

*** The question is really a legal one, and is not, we may observe, specially connected with the architectural profession; it may be raised concerning any profession in which clerks or assistants are employed. We have no hesitation in saying that the proceeding described is a very shabby one; but upon its legal aspect we do not venture to express an opinion.

EPISCOPAL HERALDRY.

Sir,—I have read with much interest the article on Episcopal Heraldry in the *Builder* of the 14th August [p. 223], but may I be permitted, as a diligent student of the subject to which it refers, to make a few corrections.

1. The date of the assumption of the cross keys in the arms of the See of York is hardly doubtful. The old arms appear for the last time on the seal of Archbishop Lee, 1531-44.

2. The arms of Fordham and Nevil should be added to the helmeted crests of Bishops of Durham.

3. The arms used for the See of Oxford were two bends, the arms of Osney Abbey, until Bishop Underhill, 1592.

4. The arms of Chichester assumed their present shape at the Reformation: see the seal of Bishop Barlow in the collection of the Society of Antiquaries.

5. An earlier instance of the combination of the arms of Bath and Wells occurs on the shield of Bishop Bekinton, 1443.

6. The effigy of Bishop Vesey of Exeter is probably correctly stated to be the only monumental effigy of a Bishop in Warwickshire, but several of the earlier Bishops of Lichfield and Coventry were buried at Coventry.

7. The Worcester arms were in existence long before the era of Julius de Medicis. They are probably derived from Godfrey Giffard, 1268: see seal *ad causas*, British Museum, xliii., 38.

W. K. R. Bedford.

Sutton Coldfield, Aug. 20, 1886.

QUARRY TILE FLOORS.

Sir,—I have just had a floor laid of 6-inch red squares (Staffordshire pressed quarries) grouted in cement, which, through the carelessness of the workmen, was not effectually washed off. Will any of your readers kindly say what is the best method to adopt to do this *now*? The floor is of course smeary, and in some parts actually contains a body of cement on its face. Could any solvent be applied to the cement without its injuring the face of the quarries, or is there nothing for it but *rubbing* it off with water and a piece of York stone or a piece of red quarry, which would be a long job? Although I have laid many quarry floors this is the first time I have been unfortunate in this respect, and so am without experience.

A reply from any of your more experienced readers would be esteemed.

H. G.

The "Four Courts," Dublin.—We are informed that the Æolus Waterspray General Ventilating and Electrical Engineering Company have received instructions to apply their complete system of heating, cooling, and ventilating, to the library and reading-room of the Four Courts, Dublin.

The Student's Column.

STONE QUARRIES.—IX.

ENGLISH HORNBLENDIC GRANITES (*continued*).

ATTENTION will now be directed to the hornblendic granite of Leicestershire. There are many different kinds of stone quarried in this district, which bear but one name,—granite,—in the market.

The hornblendic granite of *Mountsorrel*, where there are large quarries, is intrusive through a metamorphic schist; but its exact geologic age cannot be defined further than that it is of pre-carboniferous date. The neighbouring syenites of Groby and Markfield are shown by Messrs. Hill & Bonney to have been distinctly intrusive in Silurian slates, probably about the commencement of the Devonian period; whilst the greenstones of the Forest may belong to the period between the carboniferous and the trias.*

The stone obtained from the Mountsorrel quarries is of two colours, a pink and a greyish white, due to the difference in the tint of the felspar, this mineral occurring in very small crystals. The mica is black (biotite), and not too abundant, whilst, although the quartz is usually rather small, here and there it is in crystals of medium size, some being at least 14 mm. across. Hornblende occurs as minute, almost black, specks as well as thin elongated needle-shaped crystals. Microscopic sections show the presence of magnetite and apatite; and the brassy lustre of iron pyrites is apparent in places. Little round patches of exceedingly fine-grained mineral matter, of a hard nature, may also be occasionally seen in the rock; which, taken as a whole, might be described as a fine-grained, compact, hornblendic granite.

The decomposition of the surface stone by the ages it has been exposed to the weather extends down to more than 20 ft., the stone to that depth being quite friable.†

The working face of the Mountsorrel quarries is nearly half a mile in length, and forms a conspicuous object from the Midland main line between Sileby and Barrow stations. To obtain the stone, large chambers are excavated on the top of the hill, in which charges of gunpowder, sometimes as much as half a ton, are placed and fired. The blocks brought down on the floor of the quarry are then shotted, *i.e.*, split up by small charges of powder, or dynamite. Masses of the rock are sometimes hurled by these agents to surprising distances; and instances are on record of small pieces having fallen in the village at the foot of the cliff. Great precautions are taken, however, to prevent accidents.

Large quantities are broken up for macadam, both by hand and machinery. In some parts of the quarries are still to be seen a few of the old-fashioned "ring-breakers," or men making macadam by hand. These breakers use a small short-handled hammer, and hold an iron ring in their left hand. With this ring they rake down the lumps of stone on to the block upon which they are broken, and also hold the pieces together to prevent their flying about. The stone is also used for kerbing, paving-setts, gravel for paths, &c., and for concreting.

A railway line has been constructed from the works to the Midland Railway, and there is canal carriage by the Soar.

The student will find further information concerning these quarries in the *Builder* of November 12th, and December 10th and 24th, 1870.

LEICESTERSHIRE SYENITES.

Large syenite quarries have been opened in *Markfield Knoll*, near Leicester.

The colour of the stone is dark green, freckled pink. It is composed of pink orthoclase felspar in minute crystals; hornblende, which is dark green, and very abundant; and a little quartz. The minerals are not very well defined, as they so closely interlock each other, and the rock is so much altered that the accessory minerals which might be present are now unrecognisable. It is very close-grained and compact, and breaks with a splintery fracture. A vein of calcite of a pinkish-grey tint and a well-developed rhomboidal structure, crosses the face of the workings. It is so pure that it has been proposed to use it for economic purposes.

* Quart. Jour. Geol. Soc., vol. xxxiv., p. 199 (1878).
† W. J. Harrison, F.G.S., "Geol. of Leicestershire, &c.," 1877, p. 10.

Markfield stone is largely used for kerbs, paving-setts, and road metal.

Groby Quarries.—These are situated near Glenfield, and about five miles north west of Leicester.

The stone is very similar to that of Markfield, perhaps, if anything, of a little darker hue. It is composed of pink orthoclase felspar, hornblende, and a little quartz. There is also some opaque mineral, evidently in a greatly altered state, perhaps originally pyrites or magnetic oxide of iron. The felspar is in distinct crystals, but has often caught up much hornblende; the quartz fills up the spaces between the other minerals, or is curiously crystallised with the felspar, so as to form a microscopic "graphic granite" or "hebraic felspar"; and it is especially important to bear in mind that the quartz contains very many "fluid cavities," nearly filled with water, which indicate that the rock was consolidated under very great pressure. These fluid cavities also show the spontaneous movement of the bubbles contained in them very well indeed (Sorby).

The stone is used for paving-setts and road-metal. Crushed granite from quarries at Groby is used in making the Victoria stone.*

Stoney Stanton Quarries.—These are situated about nine miles south-west of Leicester, on a patch of igneous rock isolated from the main mass. The stone is a syenite, composed of quartz, felspar, hornblende, and some magnetite; it is easily worked, and is used for kerbs, road-metal, &c.

There are quarries also at *Cliff Hill*, near Markfield.

Charnwood Quarries.—These are sometimes known as "Sheepshed Quarries," and are near Loughborough. The stone is a syenite, as it contains felspar, hornblende, and a little quartz, but has undergone such an enormous amount of alteration, subsequent to its original formation, that it has a somewhat dull appearance.

When breathed upon, it emits the earthy smell characteristic of rocks containing a considerable amount of silicate of alumina. The felspar is of two colours, one being light green, almost white; the other pink. The former frequently occurs in crystals 4 or 5 mm. across; the latter not being one-fourth of this size. The tinge of green seen in the felspar has been, most probably, produced by the decomposition of hornblende. The latter is dark green, and the high specific gravity of the rock is, no doubt, due to its abundance.

The rock has been called by some a "syenitic greenstone." The term "greenstone," however, includes so many rocks of different chemical and mineralogical constitution that it is somewhat ambiguous, and is thus likely to be misunderstood. If the rock were not so much altered and the felspar in it clearly capable of being referred to a triclinic species, we should have no hesitation in calling it a quartz-diorite, which it very much resembles.

It bears considerable mineralogical similarity and might be more strictly compared with the quartz-diorite of Quenast, in Belgium, than with any other rock used in the trade. The Quenast rock is quarried for paving-setts and macadam, being largely used in North-Western Europe, and is not unknown in the London market. The stone, however, is porphyritic,—the crystals being small but prominent,—and contains distinct accessory minerals. It has been the subject of a searching investigation by MM. De la Vallée Poussin and Renard.†

We have described the Charnwood rock at some length, because its high specific gravity and crushing weight have long been a puzzle to engineers and surveyors, it being known in the market as "granite."

The quarries have been opened about twenty years, and are close to a branch of the L. & N. W. Railway.

Syenite is also found in the *Malvern Hills*, Worcestershire, where it consists of reddish felspar, quartz, hornblende, and sometimes epidote.

OTHER IGNEOUS ROCKS.

Bardon Hill Quarries.—These are situated about eleven miles north-west of Leicester, on the highest ground in the county.

The stone is not a "granite," although known by that name in the market. The Rev. T. G. Bonney says it has orthoclase and much quartz in it. He thinks that the Bardon Hill mass is the stump or plug of a cone, for there is a great deal of agglomerate on the side of the hill.

There can be no doubt that the rock belongs to the acidic series, and the term "felstone" in all probability is the one most applicable to it. It is less distinctly crystalline than the syenites of Groby or the hornblendic granite of Mountsorrel. The prevailing green colour is, no doubt, due to the decomposition of small quantities of hornblende, or other lime magnesia silicate, the resulting green hydrous silicate being more or less diffused throughout the whole rock.

The above description does not apply to the entire mass. Some varieties in the vicinity of quartzy veins present mineralogical features of much interest. The quarries are worked on two floors. The mass of the rock has a peculiar apple-green tint, and is very close in texture.*

It is much used as a road metal in the Midland counties, for which purpose it is exclusively quarried. It does not break into cubes, as do the syenites, and is mostly broken by machinery.

Penmaenmawr Stone Quarries.—These are situated in North Wales, and are well known throughout the country for paving-setts and the like.

The stone is very easily split by cutting a fine line with an axe, in the direction required, and then giving the stone a few smart taps with the hammer (Seddon).

Rowley Rag is a basalt found in Staffordshire and used for paving-setts.

* See the *Builder*, vol. l., p. 939.

† See "Mém. cour. et des sav. étrang. de l'Acad. Roy. Belgique," xl. (1876), p. 265.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

10,928, Improved Water-closets. A. A. Common.

This relates principally to improvements in closets of the valve or "Bramah" pattern. It allows them to be used also as slop sinks and urinals. The valve is secured so that it will only open to such an extent as will give passage to liquid matter when not used for the ordinary purposes of a water-closet. The seat is made movable on a hinge connected with the ordinary lever actuating the valve, by any suitable mechanical means, or by providing, in addition to the ordinary pull by which the contents of the pan are discharged, a separate independent pull or attachment to the ordinary pull, which operates to open the valve only to the extent required. The effect of the improvement is that, as the raising of the seat or the independent pull opens the valve only to an extent sufficient for the exit of the liquid, any solid body which may be accidentally in slops cannot, if emptied into the pan, pass into the pipe and choke it. If the object be valuable or useful it may be recovered. As the lifting of the seat exposes the whole area of the pan to receive the slops, it may serve also as a urinal, or the slops may be emptied into the pan without the seat being soiled.

11,077, Improvements in Brackets. A. B. Milne.

A strip of metal is doubled over on itself in such wise that the ordinary triangular bracket, such as is generally used for fixing shelves, is formed in one piece, or one part is so bent as to form the horizontal member and the other the strut. Holes are pierced through two of the thicknesses and screws bind up the bracket, as well as fasten it to the wall.

11,270, Cement. E. W. Killick.

The improvements consist in mixing together lime, chalk, clay, with coke or coal or other suitable fuel by crushing and grinding by any convenient machinery, so as to form a stiff pug of the said materials, or some of them ready for insertion direct into the kiln for burning, thus dispensing with washing, pumping, and drying previously to the kiln burning as at present. The proportion of the ingredients used is as at present, with about one-fourth fuel to three-fourths stuff.

1,239, Embossed Decorative Material. E. Conrath.

This has for its object the manufacture of material for decorating walls and other surfaces which shall be flexible and elastic, impervious to damp, and non-absorbent of vapours or infectious matters. The textile backing of fabric, similar to thin kamptulicon, is pasted with brown paper and passed in continuous lengths. After the composite material is dry, it is passed between rollers, one engraved in relief the other in intaglio. By using in this way, kamptulicon, a very flexible and elastic, waterproof and non-absorbent material is produced, which is of excellent appearance when decorated and finished.

* W. H. Hudleston, M.A., F.R.S., in "Proc. Geol. Assoc.," vol. iv.—Excursion to Charnwood Forest.

NEW APPLICATIONS FOR PATENTS.

August 13.—10,384, G. Nobes, Door Lock.—10,386, E. Abate, Extinguishing Fires in Chimneys.

August 14.—10,408, J. Wilson, Ventilation of Rooms.—10,430, J. & H. Anthon, Band Saws.—10,453, R. Evered and N. Coleman, Flushing Cisterns.

August 16.—10,460, J. Anderson, Bevelling Band Sawing Machines.—10,464, C. Thornett, Fastening Window Sashes, either Shut or Partly Open.—10,503, E. Law, Wood Doors and Other Framing with Zinc, Iron, and Other Metallic Frames.

August 17.—10,526, 10,527, 10,528, and 10,529, W. Alvord, Knob Attachments.—10,531, A. Boult, Water-closets.—10,544, H. Haddan, Tiles.—10,554, W. Lake, Preventing the Slamming of Doors.

August 18.—10,572, H. Hills and T. Menke, Screws.—10,573, J. Rankin and W. Palmer, Sash Fasteners.—10,574, A. Drummond, Manufacture of Glass, &c.—10,589, H. Stanley, Portable Saws.—10,603, W. Lake, Ventilating.

August 19.—10,625, J. Denny, Lock Girder Tiles.—10,631, J. Mobberley and H. Perry, Bricks.

PROVISIONAL SPECIFICATIONS ACCEPTED.

8,107, A. Dougill, Lining Sewers, Tunnels, and Subways made of Segments of Iron and Concrete.—8,665, W. Baraclough, Door Chains and Locks.—8,957, R. Skeoch and W. Woodson, Brick Kiln, &c.—9,150, O. Gilbert, Latch Operating Devices.—9,186, J. Nicholson, Step Ladders.—9,252, F. Dove, Cramps.—9,332, J. Carvell and W. Holland, Varnishes.—9,724, W. Patterson, Water Taps.—9,900, J. Alexander, Cistern Ball Valves.—8,584, F. Botting, Flushing Water Closets.—8,886, J. Price, and J. Wayne, Firegrates.—9,205, S. Newman, Dowel Pins.—9,552, E. and H. Lanaway, Ladders. 9,612, F. Royce, Electric Bells.—9,729, T. Bayley, Colouring Marble.—10,150, J. Baere, Preventing Down Draughts in Chimneys.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

10,934, R. Stone, Manufacture of Cement.—12,250, R. White, Chimney-pots, &c.—12,403, J. Deeley, Flushing Cisterns.—3,214, A. Browning, Gas and Water Meter.—9,202, R. Woodhouse and S. Mitchell, Guards for Circular Saws.—11,225, E. Jones, Gate Latches.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

August 17.

By Bean, Burnett, & Co.

Fulham—25, Chesilton-road, 94 years, ground-rent 8*l.*	£425
40, Fulham Park Gardens, 91 years, ground-rent, 4*l.*	490
West Kensington—68, Edith-road, 87 years, ground-rent 11*l.*	690

By Debenham, Tewson, & Co.

City, 46, Basinghall-street, freehold	8,000
Upper Norwood—The residence Pinehurst, 77 years, ground-rent 17*l.*	1,800
Finsbury Park—132, Stroud Green-road, 81 years, ground-rent 7*l.* 10s.	470
Stratford—56 and 58, The Broadway, 30 years, ground-rent 43*l.*	1,020

August 18.

By H. C. Newson.

Wellclose-square—No. 33, and the King's Arms Public House, freehold	1,950
Fulham—9 and 11, Goodson-road, freehold	420

By J. Ellen & Son.

Amesbury, near—The Bulford Estate, comprising mansion and 1,902a. 2r. 14p., freehold	24,000

By J. H. Lynch.

Islington—119, Bemerton-street, 57 years, ground-rent 6*l.*	230
Shacklewell—1 to 5, Middle-street; 1 to 5, James's Place; and 11 and 13, Hindle-street, 27 years, ground-rent 44*l.*	1,310
24 to 34 even, Dunn-street, 27 years, ground-rent 16*l.* 10s.	690
Forest Gate—5, 6, 7, and 8, Chapel-street, 69 years, ground-rent 16*l.*	445
Old Kent-road—164, Summer-road, 38 years, no ground-rent	365

By Marsh, Milner, & Langton.

Oxford-street—112 and 114, Great Portland-street, 21 years, ground-rent 60*l.*	1,940
Marylebone—110, Great Titchfield-street, 22 years, ground-rent 18*l.*	400
16, Welbeck-street, 10 years, ground-rent 40*l.*	450

August 19.

By M. Miles.

Farringdon-road—Nos. 151 and 153, freehold	1,500

By G. A. Bickerton.

Islington—9, Barford-street, 63 years, ground-rent, 5*l.*	320
Barnsbury—32, Wellington-road, 57 years, ground-rent 6*l.* 6s.	230

By Izard & Dawe.

Chelsea—528 and 530, King's-road, 69 years, ground-rent 10*l.*	1,180

By Newbon & Harding.

Barnsbury—17, Thornhill-crescent, 63 years, ground-rent 8*l.*	500
Holloway—41, Russell-road, 74 years, ground-rent 6*l.* 6s.	275
Hoxton—35, Napier-street, 18 years, ground-rent 3*l.*	195
63 and 64, Napier-street, 19 years, ground-rent 7*l.*	365

Miscellanea.

Wood Pulp v. Plaster of Paris.—An important discovery has just been made at the Sognedal Pulp Factory in Norway, after several years' experimenting, wood pulp being used for the manufacture of the kinds of building ornaments which are generally made in plaster of Paris. The pulp is first ground from wood, and then, by a machine, pressed into any kind of ornament, such as ceilings, friezes, bas-reliefs, rosettes, &c., which are quite as well finished as similar articles of plaster of Paris. Another feature is that the articles made from the pulp show painting or gilding to great advantage. Tests have also been made with regard to their strength, by dropping them from various heights or hurling them against stone walls, the results being highly satisfactory. Thus, for instance, a bar of this material 1 ft. in length, 1 in. in thickness, and 5 in. in width, neither broke nor sustained any serious injury on being hurled with full force against a stone wall a couple of yards distant. Naturally, too, this material is far lighter than plaster of Paris, an important advantage, as no great harm would be caused to a person by ornaments made from it falling upon him, which is otherwise with those made from plaster of Paris. It should also be mentioned that pulp ceilings, friezes, &c., are, by the hardness and compactness of the material, impervious to wet, and that they may, if desired, be fastened by nails or screws. Finally, the inventors state that ornaments made from this material cost only half the price of similar ones made from plaster of Paris. This discovery will, it is believed, give great impetus to the pulp factories of Scandinavia, which are now almost unprofitable, through the low prices of paper prevailing abroad, and the utter failures which have attended the vast production of the latter, direct from wood pulp, by a firm in London.

Dennett & Ingle's Fireproof Construction.—We learn from the Nottingham papers that the patent fireproof floors manufactured by Messrs. Dennett & Ingle, of Nottingham, satisfactorily passed the ordeal of a severe test at the fire which took place recently at Messrs. Henry Cooper & Sons' lace factory, Robin Hood and Roden streets, Nottingham. The floors are formed of concrete, and in the room in which the fire broke out are about 18 in. thick. (This depth of 18 in., we are informed, is "over all," including the wood floor, &c. The thickness of the Dennett arching is 4½ in. in crown, with a rise of 5 in.). There were beams below this to which machinery is fastened, and above joists, which support the wooden floors of the rooms above. The chief thing noticeable as giving conclusive evidence as to the intensity of the heat is a 3-in. line shaft 9 ft. distant from the floor, which is considerably twisted and contorted. Some large iron girders in the room are twisted into all manner of forms, whilst some zinc at a distance from the floor has evidently been melted. Nevertheless, the fire was entirely confined to the room in which it originated, thanks to the floors. The room in which the fire occurred was situated in the fourth story. It is stated that in a room directly over the spot where the fire must have been the hottest there was stored a large quantity of combustible material and delicate lace machinery, which is none the worse for the heat to which it has been subjected.

Newhaven Drainage.—A Local Government inquiry was held at Newhaven on the 18th inst., by Mr. Thomas Codrington, C.E., to consider an application of the local Board to borrow 5,900*l.* for the drainage of the town. Mr. W. H. Radford, Assoc. M. Inst. C.E., of Nottingham, explained the plans, and showed the method adopted to store the sewage during high tide. The harbour authorities, Lord Sheffield, and other landowners interested, were represented. The inquiry was adjourned to allow time for Mr. Radford to complete negotiations with the harbour authorities, the Board of Trade, and the War Office.

Shustoke.—A new church is about to be built at Shustoke, Warwickshire. Messrs. Bodley & Garner are the architects, and the building is to be carried out by Messrs. Stephens, Bastow, & Co., of Bristol and London.

A Stained-Glass Window has just been placed in the Wesleyan Chapel at Chislehurst, in memory of the late Mr. Thomas P. Bunting. It is from the studio of Messrs. Powell Bros., of Leeds.

Health of English Watering Places.—The statistics bearing upon the recent health of English watering-places published in the Registrar-General's Quarterly Return, just issued, must afford considerable satisfaction to the thousands who are now migrating from our large towns to these holiday resorts. It appears that the mean annual death-rate during the three months ending June last among the more than a million of the resident population of forty-six seaside and inland watering-places of England and Wales did not exceed 15·6 per 1,000. This rate was 2·4 below the general rate in the whole of England and Wales, and 1·9 below the mean rate among the nearly eleven millions of persons living in the rural districts, comprising the country parishes with their small towns and villages. With regard to the zymotic mortality in these watering-places, the report is scarcely less satisfactory. The annual death-rate from the principal zymotic diseases in these forty-six holiday resorts was 0·97, against 1·55, the mean rate in England and Wales, and 1·36 in England and Wales, exclusive of the seventy-eight large towns. No zymotic diseases were registered during the quarter in Weston-super-Mare or in Tenby, while the rates in the other watering-places ranged upwards from 0·22 and 0·23 in Torquay and Whitby, to 2·11 in Eastbourne, 2·15 in Southend, 2·16 in Folkestone, and 2 63 in Herne Bay. In most cases in which the zymotic death-rate showed an excess this was due to the epidemic prevalence (during the three months ending June last) of measles or of whooping-cough. Measles was somewhat fatally prevalent in Hastings, Exmouth, and Blackpool; whooping-cough in Scarborough, Lowestoft, Folkestone, Eastbourne, and Worthing; scarlet fever caused six deaths in Yarmouth; and diphtheria mortality showed an excess in Southend, Folkestone, Rhyl, and Blackpool. It should also be stated that "fever," principally enteric, caused an exceptionally high death-rate in the watering-places on the Kentish coast, especially in the Isle of Thanet and in Dover. It should be borne in mind that the Registrar-General's figures afford no information of more recent date than the end of June, since which it is quite possible, for instance, that the outbreak of "fever" in the Isle of Thanet, wnich appears to have about equally affected the registration sub-districts of Margate and Ramsgate, has entirely disappeared. It would be judicious and useful to intending visitors if watering-places at this season of the year published monthly health bulletins readily accessible to the public. The health of English watering-places has now reached a general standard, and their reputation has most to gain from publicity and most to fear from false reports arising from the difficulty of getting promptly authentic information respecting their health and mortality statistics.—*Lancet*.

A Universal Tinker Company.—Some months since a humorous article by Mark Twain appeared in the American *Century* magazine with reference to the constant small repairs required in houses. In the June *Century* the editor states that the practical suggestions of Mark Twain have been at once taken up in New York, and a "Universal Tinker Co." now announces to householders that they propose to take this annoyance and excessive expense off their hands; that they will put their houses in proper repair, and will, for a small sum monthly, cause the houses to be inspected and kept in a constant state of repair. They state that they will mend gas-leaks, keep the waste and water pipes joint-tight, look after electric bells, inspect the plumbing, silence creaking doors, jack-plane the edges of doors that will not shut, correct obstinate sashes, so that they slip up and down, put a shelf here and there, put in window-panes, mend roof leaks with slate, tin, or shingle; make periodical search for sewer gas, pack water-pipes and waste-pipes where the thoughtful plumber has left them to freeze, fix window-catches that now invite the festive burglar, put on door-knobs, repair locks. In fact, repair and put in shape all breakages and disorders that happen in and about a house. We recommend this idea to ingenious promoters on this side of the water.—*Sanitary Record*.

Stamford Brook.—H.R.H. Princess Mary, Duchess of Teck, laid on Monday last the memorial stone of the Church of St. Mary, Stamford Brook, W. Mr. Charles I. Gladman is the architect, and Messrs. Dove Bros. are the contractors.

The New "Essex-street Chapel" at Kensington.—The new place of worship for the Unitarian body, in course of erection at Kensington, in place of the Essex-street Chapel, Strand, now converted into Essex Hall, is fast advancing towards completion, and it is expected that it will be formally opened in the course of a month or two. The building is Gothic in character, and faced with red brick and Portland stone dressings. The principal elevation is in the Mall, near the Notting-hill Station and Bayswater-road. At the west end of this frontage there is a tower, with spire rising to a height of 125 ft. The upper portion of the tower contains a lofty belfry stage, with angular turrets. The entrance to the chapel is in the centre of the frontage. It is approached by a flight of ten steps, the ground-floor of the building being 5 ft. above the street level. The roof is covered with Broseley tiles. The vestibule at the entrance to the building is enclosed by a screen in pitch-pine, filled in with glass. Internally the edifice is 76 ft. in length and 43 ft. in width, and will seat a congregation of about 500, a portion of which will be accommodated in a small gallery at the west end. The minister's and deacons' vestries are at the east end. The height of the interior is 45 ft., the ceiling consisting of a cove surmounted by a wagon-headed vault in pitch-pine. In addition to the chapel itself, there is spacious schoolroom accommodation in the basement. A residence for the minister is in course of erection on a site immediately adjoining the chapel. Messrs. T. Chatfeild Clarke & Son are the architects, and Mr. J. T. Chappell, of Grosvenor-road, is the contractor.

The Oakleigh Park Estate at Harold Wood.—The sale of the first portion of the Oakleigh Park Estate, adjoining the Harold Wood Station of the Great Eastern Railway, was noticed in the *Builder* a few weeks since. On the conclusion of this sale, all the plots offered having been disposed of, it was announced that the second portion of the estate would be offered in the autumn, when the new roads in progress of construction were completed; but in consequence of the demand for more of the building sites, 129 additional plots were submitted to competition last week, in a marquee on the ground, by Messrs. Baker & Sons. There was a very numerous attendance at the sale, and all the plots were eagerly bought up, those having frontages of 18 ft., and depths of from 100 ft. to 120 ft., realising from 15*l.* to 20*l.* each, whilst those having frontages of 15 ft., and depths of from 80 ft. to 90 ft., were sold for 10*l.* to 15*l.* each. One plot, having a frontage of 28 ft., and a depth of 280 ft., realised 80*l.* There being a call for still further plots, ninety-five more sites were submitted, all of which were sold,—the entire number of sites disposed of during the day being 224. Building has already commenced, and when completed the estate will contain about 500 houses and shops, with accommodation for an estimated population of about 3,000.

The Royal Jubilee Exhibition, Manchester.—The Council have approved of the amended plans submitted by the architects, Messrs. Maxwell & Tuke. The alterations include the location of the machinery in motion in an annexe at the south side of Talbot-road. This annexe will also form the principal entrance to the Exhibition from the railway, and will stand in an enclosure of about nine acres of land, one acre of which will be used for refreshment-rooms and ornamental shrubberies, and six acres for outside exhibits. The architects have considerably improved the elevations by raising the central dome and the two pavilions, thus giving to the whole façade a much bolder appearance. The whole area of land occupied by the exhibition and the grounds attached thereto will be about thirty-two acres. Sixteen acres, forming the site of the Royal Botanical Gardens, will be devoted entirely to outside display, including fairy fountains and electric illuminations. We understand that the contracts are to be obtained immediately, and the architects hope that the works will be in active operation by next month.

Horsforth Church, Yorks.—Stained glass has been inserted into another of the north aisle windows, by way of memorial to the late Mr. George Shearer, of Leeds. The subject illustrated is the Nativity of Christ, and the work has been designed and executed by Messrs. Powell Bros., of Leeds.

PRICES CURRENT OF MATERIALS.

TIMBER.	£. s. d.	£. s. d.
Greenheart, B.G. ....ton	6 5 0	7 0 0
Teak, E.I. ....load	9 0 0	14 0 0
Sequoia, U.S. ....foot cube	0 2 4	0 2 7
Ash, Canada ....load	3 0 0	4 10 0
Birch „	2 10 0	4 0 0
Elm „	3 10 0	4 10 0
Fir, Dantsic, &c.	1 10 0	4 0 0
Oak „	2 10 0	4 10 0
Canada	3 0 0	6 0 0
Pine, Canada red	2 0 0	3 10 0
„ yellow	2 5 0	4 0 0
Lath, Dantsic ....fathom	3 0 0	5 0 0
St. Petersburg	4 0 0	5 10 0
Wainscot, Riga....log	2 15 0	4 0 0
„ Odessa, crown	3 5 0	3 7 6
Deals, Finland, 2nd and 1st...std. 100	7 0 0	8 0 0
„ 4th and 3rd	6 0 0	7 0 0
„ Riga	5 10 0	7 0 0
St. Petersburg, 1st yellow	8 0 0	14 0 0
„ 2nd „	7 0 0	8 0 0
„ white	7 0 0	10 0 0
Swedish	6 0 0	15 0 0
White Sea	7 0 0	17 10 0
Canada Pine, 1st	17 0 0	30 0 0
„ 2nd	12 0 0	17 0 0
„ 3rd, &c.	6 0 0	10 0 0
„ Spruce 1st	8 0 0	11 0 0
„ 3rd and 2nd	5 0 0	7 10 0
New Brunswick, &c....	5 0 0	7 0 0
Battens, all kinds	4 0 0	12 0 0
Flooring Boards, sq. 1 in., Prepared, first	0 9 0	0 18 0
Second	0 7 6	0 8 6
Other qualities	0 5 0	0 7 0
Cedar, Cuba....foot	0 0 3	0 0 3¾
Honduras, &c.	0 0 2¾	0 0 3¾
Australian	0 0 2	0 0 3
Mahogany, Cuba	0 0 4	0 0 7
St. Domingo, cargo average	0 0 4	0 0 7
Mexican „	0 0 3½	0 0 4½
Tobasco „	0 0 4	0 0 6½
Honduras „	0 0 4½	0 0 6½
Maple, Bird's-eye....	0 0 6	0 0 8
Rose, Rio ....ton	7 0 0	10 0 0
Bahia....	6 0 0	10 0 0
Box, Turkey	5 0 0	17 0 0
Satin, St. Domingo ....foot	0 0 7	0 0 11
Porto Rico	0 0 8	0 1 2
Walnut, Italian	0 0 4	0 0 5

METALS.	£. s. d.	£. s. d.
Iron—Pig, in Scotland ....ton	0 0 0	0 0 0
Bar, Welsh, in London....	4 7 6	4 15 0
„ „ in Wales	4 2 6	4 7 6
„ Staffordshire, London	5 10 0	6 0 0
Sheets, single, in London....	6 15 0	8 10 0
Hoops „	6 0 0	7 0 0
Nail-rods „	5 10 0	6 10 0
Copper—		
British, cake and ingot ....ton	42 0 0	43 0 0
Best selected	42 10 0	43 10 0
Sheets, strong....	47 0 0	48 0 0
„ India	44 10 0	45 10 0
Australian	0 0 0	0 0 0
Chili, bars	39 10 0	39 15 0
Yellow Metal....lb.	0 0 3¼	0 0 4¼
Lead—		
Pig, Spanish	0 0 0	0 0 0
English, common brands....	0 0 0	0 0 0
Sheet, English	0 0 0	0 0 0
Spelter—		
Silesian, special ....ton	0 0 0	0 0 0
Ordinary brands	0 0 0	0 0 0
Tin—		
Banca ....ton	0 0 0	0 0 0
Billiton	0 0 0	0 0 0
Straits	98 10 0	0 0 0
Australian	99 0 0	0 0 0
English ingots....	102 0 0	0 0 0
Zinc—		
English sheet ....ton	18 0 0	18 5 0

OILS.		
Linseed ....ton	21 17 6	22 5 0
Cocoanut, Cochin	32 10 0	33 0 0
Ceylon	25 10 0	25 15 0
Copra....	0 0 0	0 0 0
Palm, Lagos	23 0 0	23 10 0
Palm-nut Kernel	0 0 0	0 0 0
Rapeseed, English pale....	22 5 0	0 0 0
„ brown	20 10 0	0 0 0
Cottonseed, refined	19 0 0	20 0 0
Tallow and Oleine	25 0 0	45 0 0
Lubricating, U.S.	6 0 0	10 0 0
„ Refined	8 0 0	13 0 0
Turpentine—		
American, in casks....cwt.	1 6 6	1 6 9
Tar—Stockholm ....barrel	0 15 0	0 15 6
Archangel....	0 10 6	0 11 0

COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
School Buildings	Sunderland School Brd.	50*l.*, 20*l.*, and 10*l.* ...	Sept. 25th	ii.
Public Hall, &c....	Lewes Town Council ...	20*l.* and 5*l.*	October 9th	ii.
Statue of late Earl of Dudley....	The Memorial Com.....	Not stated	Not stated...	ii.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Exhibition Buildings, Newcastle-upon-Tyne...	Executive Council	W. Glover	Sept. 3rd	ii.
Brick Culvert and Pipe Drain	Yeovil Corporation.....	R. Vining	Sept. 4th	ii.
Paving, Sewering, and Making-up Road, &c.	Beckenham Local Brd.	G. B. Carlton	Sept. 6th	ii.
Fireproof Floor, Iron and Glass Roof, &c. ...	St. Marylebone Public Baths and W. Com.	J. Waldram	Sept. 7th	ii.
Granite and Ragstone	Reigate Town Council...	*Official*	do.	ii.
Paving Works....	Rotherhithe Vestry.....	E. Thomas....	do.	xiii.
Iron Fencing, Roads, &c., of Cemetery	New Shoreham Burial Board	A. Loader	Sept. 8th	xiii.
Cutting through Embankment	Lambeth Guardians.....	Catt & Smith....	do.	ii.
Broken Granite, Flints, &c.	Barking Town Local Bd.	*Official*	Sept. 9th	ii.
New Coast Guard Station and Battery	Admiralty	do.	Sept. 10th	ii.
Erection of Coal Shed, Grays	Met. Asylums Board...	H. Jarvis & Son	Sept. 11th	ii.
Painting and Repairs	City of London Union...	*Official*	Sept. 13th	ii.
New Schools, &c.	Wednesbury Schl. Brd.	E. Pinched	Sept. 20th	ii.
Lying-in Wards at New Workhouse	Wandsworth & Clapham Union	T. W. Aldwinckle	Sept. 23rd	ii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Town Surveyor	Lowestoft Town Council	250*l.*	Sept. 3rd	xvi.
Clerk of Works	Fulham Vestry.....	3*l.* 3s. per week	Sept. 6th	xvi.
County Surveyorships in Ireland	Civil Service Com.	Not stated	Sept. 10th	i.

TENDERS.

BLACKFRIARS.—For alterations, Stamford-street Chapel, Blackfriars. Messrs. Catt & Smith, architects, Furnival's Inn. Quantities supplied by Mr. J. Scott :—

Rice	£329 0 0
J. Holloway	315 0 0
Rider & Son	308 0 0
F. Higgs....	290 0 0
Smith	242 0 0
T. Dowling (accepted)	233 0 0

BOURNEMOUTH.—For additions to Rylstone, West Hill-road, Bournemouth, for Mr. John J. Shipman. Mr. T. Arthur Lewis, architect. Quantities supplied :—

James	£305 0 0
McWilliam & Son	287 10 0
Davis & Lambert....	279 15 0
George & Harding	266 0 0
Lucas & Crosser	265 0 0
Lawson & Donkin	255 0 0
Hoare & Sons (accepted)	248 0 0

BRISTOL.—For alterations and erection of additions to shop and premises, Clarence-road, Bristol, for Mr. T. Lamb. Mr. Thos. Hodge, architect. Quantities by Mr. A. Barratt, surveyor, Bristol :—

Humphreys	£948 0 0
E. Gay*	870 0 0
J. James	830 0 0
Graham	725 0 0

* Accepted subject to modified drawings.

CAMBERWELL.—For two pairs of villa residences, Camberwell. Mr. Geo. Hubbard, architect. Quantities by Mr. J. Sargeant :—

Bartholomew....	£7,336 0 0
Hanson	5,265 0 0
Braid	4,934 0 0
Patman & Fotheringham	4,819 0 0
Balsam	4,800 0 0
Colls....	4,788 0 0
Chappell	4,678 0 0

CANNING TOWN.—For alterations to the Vincent Tavern, Canning Town, for Mr. J. Gooch. Mr. F. A. Ashton, architect, Stratford, E. :—

Mansell	£525 0 0
Scotney	473 0 0
Nicholls	415 0 0
Taylor....	410 0 0
J. & F. Bane (accepted)	383 0 0

CUBITT TOWN.—For building two houses in Billson-street, Cubitt Town, for Mr. F. B. Kidd. Mr. Stocker, architect, St. Mary Axe :—

W. Buckland (accepted)	£644 10 0

DEAL.—For converting the Old Custom House, High-street, into three houses and shops, for Mr. Henry S. Watts, J.P. Mr. E. W. Fry, Dover, and Mr. Alfred Broad, Croydon, joint architects. Quantities by architects :—

W. & T. Denne, Walmer	£1,895 0 0
G. Cottew, Deal	1,798 0 0
J. Trollope, Walmer	1,693 0 0
J. J. Wise, Deal	1,598 0 0
G. H. Denne & Son (accepted)	1,565 0 0

ESSEX.—For the erection of a dwelling-house and shop at Manor Park, Essex, for Mr. G. T. Hough. Messrs. Brown & Pritchett, architects, Theobald's-road, W.C. Quantities not supplied :—

Mansell,* Stratford....	£840 0 0
Arthur, Kentish Town	635 0 0

[Architect's estimate, 615*l.*]

* Accepted at 615*l.*

EXETER.—For erecting ball-room, supper-room, and offices as additions to the Rougemont Hotel, Exeter, for the Rougemont Hotel Company. Mr. Charles E. Ware, architect. Quantities by Mr. Charles Pinn, Exeter :—

Lapthorne & Goad, Plymouth	£4,290 0 0
Rowse, Plymouth....	4,270 0 0
Vicary & Son, Exeter	4,050 0 0
Woodman, Exeter	3,994 0 0
Stephens & Bastow, Bristol	3,749 0 0
Gibbard, Exeter	3,742 0 0
Gibson, Exeter....	3,670 0 0
Reed, Plymouth	3,643 0 0
Scadding, Exeter....	3,600 0 0
Lamacraft, Dawlish....	3,479 0 0
Commings, Exeter	3,470 0 0
Bevan, Plymouth....	3,430 0 0
Phillips, Exeter	3,414 0 0
Trevena, Plymouth (accepted)	3,390 0 0

HOLLOWAY.—For erecting a mission-room, Andover-road, Holloway :—

McCormick & Sons, Canonbury	£997 0 0
G. T. Williams & Son, Barnsbury	987 0 0
Macfarlane & Sons, Hornsey-road	960 0 0
Mattock Bros., Holloway	955 0 0
R. Wallace,* Tollington Park	700 0 0

* Accepted.

KNIGHTSBRIDGE.—For re-arranging the sanitary and hot water arrangements at 36, Rutland Gate, for Mrs. Barlow :—

Winser & Co., 52, Buckingham Palace-road (accepted)	£319 2 0

LEYTONSTONE.—For the erection of a shop and dwelling-house, High-road, Leytonstone, for Mr. R. Skelton, M.R.C.V.S. Mr. F. A. Ashton, architect, Stratford, E. :—

Corhead	£944 0 0
Roome....	905 0 0
Mansell	875 0 0
Hearle & Son....	847 0 0
J. & F. Bane....	844 0 0
Nicholls (accepted)....	815 0 0

LONDON.—For building the Bryanston Club, St. John's-place, Lisson-grove. Mr. George Hubbard, architect :—

		A.	B.	C.
Rhoades....	£5,870	£370	£86	£—
G. Shaw....	5,519	356	89	74
Morter	5,440	379	89	—
Colls & Sons....	5,410	360	90	—
J. Chappell	5,222	340	92	—
F. Mark....	5,200	340	100	50
J. Holland	5,199	353	50	20
Holliday & Greenwood...	4,949	320	54	50
Simpson & Sons	4,946	311	42	25
A. & E. Braid	4,785	287	42	110
Patman & Fotheringham	3,897	337	17	75

A. Deduct if part of basement is omitted.

B. Deduct if staircases are executed in Shap silicated stone in lieu of York stone.

C. Deduct for old materials.

LONDON.—For sundry alterations and new bar fittings and counters, &c., at the Redan Tavern, No. 1, Westbourne Grove, for Mr. J. G. Veale. No quantities. Mr. F. J. Eedle, architect, Railway Approach, London Bridge :—

Bowles	£1,927 0 0
Langridge & Son	1,469 0 0
Vears & Co.	1,410 0 0
Jackson & Todd	1,318 0 0
Canning & Mullins	1,228 0 0
W. & F. Croaker	1,184 0 0

LONDON.—For new roof and alterations to No. 149, Sloane-street, and 1, Sloane-terrace, for Mrs. McClean. Messrs. Perry & Reed, architects, 9, John-street, Adelphi. Quantities supplied by Mr. H. E. Pollard :—

	General Estimate.	Pointing.	Credits.
Clarke & Bracey	£567	£37 0 0	£5
Burch & Co.	539	16 0 0	12
Green	467	27 0 0	13
Vears & Co.	429	21 10 0	5

LONDON.—For repairs to houses, Cadell-street, and Nos. 228, 230, 232, Hackney-road, for Mr. Ernest Benjamin Wilson :—

C. Hyatt (accepted) £370 13 0

LONDON.—For alterations and additional floor at 14, Pont-street, Belgrave-square, for Mr. H. Herbert. Messrs. Godwin & Basley, architects :—

Norris & Luke (accepted) £295 0 0

[No competition.]

LONDON.—For sundry alterations and repairs to 4, Bolton-row, Mayfair, for Mr. F. C. Grove :—

Lyne & Smith	£376 5 6
W. & E. Curtis	232 0 0
Wetherilt, Lee, & Martin (accepted).	229 8 0

Hot-Water Work.

Wetherilt, Lee, & Martin (accepted).

LUTON.—For alteration, &c., to premises Nos. 13 and 15, Wellington-street, for Mr. C. Jones. Mr. W. J. Pearson, architect :—

D. Parkins	£229 0 0
Cox Bros.	225 0 0
Slough	216 0 0
Neville (accepted)	205 0 0

LUTON.—For the erection of a new residence, High Town-road, for Mr. E. Oakley. Mr. W. J. Pearson, architect :—

J. Saunders	£889 10 0
W. Dunham	758 10 0
Neville Bros.	756 0 0
Cox Bros.	750 0 0
D. Parkins	749 0 0
J. Sinfield	742 13 0
Slough Bros.	730 0 0
G. Smart	695 0 0
C. Wright (accepted)	639 0 0

LUTON.—For new warehouse, King-street, for Mr. F. C. Scargill. Mr. W. J. Pearson, architect. Quantities not supplied :—

Saunders	£1,672 0 0
Sinfield	1,580 0 0
Ford	1,575 0 0
Cox Bros.	1,535 0 0
Slough Bros.	1,525 0 0
Smart	1,495 0 0
Wright	1,449 0 0
Parkins (accepted)	1,398 0 0

MILE END.—For the erection of new caretaker's house and alterations, painting, &c., at South Grove Board School, Mile End. Mr. Thomas J. Bailey, architect :—

Norris & Luke (accepted) £548 0 0

SHADWELL.—For the erection of a new ice factory in Lower Shadwell, E., for the Linde British Refrigeration Company (Limited). Mr. Charles Dunch, architect. Quantities by Mr. James F. Wesley, Forest Gate :—

Gentry	£18,900 0 0
Morter	18,841 0 0
Nightingale	18,600 0 0
Harris & Wardrop	18,540 0 0
Holland & Hannen	18,337 0 0
Ashby & Horner	18,250 0 0
Mowlem & Co.	18,057 0 0
Kirk & Randall	14,936 0 0
Higgs & Hill	14,600 0 0
Brown, Son, & Blomfield	13,150 0 0
Chafen	12,987 0 0

STRATFORD (Essex).—For a new soap factory for Messrs. Harris & Sons, Stratford, Essex. Mr. J. T. Newman, architect, Fen-court, E.C. Quantities by Mr. C. Stanger, Finsbury Pavement, E.C. :—

Taylor	£3,929 0 0
Hoskings	3,855 0 0
Marten	3,848 0 0
Reed	3,818 0 0
Higgs & Hill	3,795 0 0
Larke	3,726 0 0
Gregar	3,647 0 0
Lawrance	3,593 0 0
Hack	3,494 0 0
Hearle	3,493 0 0

[Architect's estimate, 3,525*l.*]

STOKE NEWINGTON.—For the erection of a Congregational Church at corner of Evering and Rectory roads, Stoke Newington. Mr. R. A. Lewcock, architect, Bishopsgate-street Within :—

	A.	B.	C.	D.
Boyce	£9,280	£30 0	£840	£290
Patman & Fotheringham	8,983	27 0	693	279
Nightingale	8,685	30 0	762	300
Goodall	8,652	32 0	749	277
Dobbs	8,547	32 0	670	298
Shurmur	8,480	31 0	734	250
Perry & Co.	8,200	35 0	650	270
Stephenson	7,991	31 0	689	257
Morter	7,987	30 0	618	258
Dove Bros.	7,695	35 0	540	240
Jackson & Todd	7,650	27 10	625	225
Lawrance & Sons	7,575	25 0	691	219

A. For church and works connected.
B. For temporary roof of tower.
C. For upper part of tower and spire.
D. For boundary walls, gates, and fences.

STOKE NEWINGTON.—For alterations and additions to Billiard-room of the Albion Public-house, Albion-road, Stoke Newington, for Mr. J. Nichols. Messrs. G. Carter & Son, architects :—

Norris & Luke (accepted) £164 0 0

SURREY.—For the erection of a house at Hind Head, for Mr. R. T. Plumpton, Ph.D. Mr. Arnold S. Tayler, architect, London. Quantities by Mr. Cecil G. Saunders, surveyor :—

Goddard & Sons	£1,055 0 0
Tompsett & Kingham	1,016 0 0
J. & A. Gammon	899 0 0
R. Pink,* Milford, near Godalming	885 0 0

* Accepted.

TEDDINGTON.—For first portion of superstructure of new parish church. Mr. W. Niven, F.S.A., architect. Quantities by Mr. C. J. Mann :—

		A.
Wilson & Son, Birmingham	£22,258	£695
J. Shillitoe, Bury St. Edmunds	20,900	900
J. T. Chappell	20,547	1,053
B. E. Nightingale	20,450	1,300
Stephens & Bastow, Bristol	19,176	743
Longmire & Burge	18,970	590
Goddard & Sons, Farnham	18,934	755
Adamson & Sons	18,430	625

A. Add for Doulting stone facing in lieu of red brick.

TUNBRIDGE WELLS.—For building a church mission room at High Brooms, Tunbridge Wells, for the Rev. Hay Chapman. Mr. Brett A. Elphicke, architect. Quantities by Mr. J. T. Carew :—

Judd	£1,829 10 0
Strange & Son	1,776 0 0
Beale	1,616 19 0
Denne	1,582 0 0
Paramor	1,564 0 0
Gallard	1,561 0 0
Jarvis*	1,485 0 0

* Reduced to 1,012*l.*, and accepted.

TWICKENHAM.—For alteration and additions at Hill Villa, for Mr. J. B. Chancellor. Messrs. Brown & Pritchett, architects, Theobald's-road. Quantities not supplied :—

Rose & Sons, Twickenham	£670 0 0
Jolliffe, Notting Hill	643 0 0
Arthur, Kentish Town (accepted)	630 0 0

[Architect's estimate, 630*l.*]

Re Alterations to No. 8, Half Moon-street, Piccadilly.—We are asked to state that the tender attributed to "Lee" in our last issue, should have been attributed to "Wetherilt, Lee, & Martin."

SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our office, 46, Catherine-street, W.C., *not later than Four p.m.* on THURSDAYS.

Best Bath Stone.

WESTWOOD GROUND,
Box Ground, Combe Down,
Corsham Down,
And Farleigh Down,
RANDELL, SAUNDERS, & CO., Limited,
Corsham, Wilts. [Advt.

TO CORRESPONDENTS.

Registered Telegraphic Address, "The Builder, London."

A.B.—A. P. J. C.—J. C. (of course,—concrete is constantly used in that way).—S. T.—C. S.—T. & G.—M. T. (there is a good deal of truth in your comments; but we are not disposed to encourage architects to address to this journal anonymous letters criticising each other's works).—S. S. Dublin (ditto).—W. S. (about one-third to one-half larger is generally the best proportion; but we can say nothing about publication until we see the drawing).—C. S.—"A Sympathiser," &c. (we fear your zeal is "not according to knowledge," the suggestion you make, however well meant, being simply absurd. We may observe, by the way, that an overworked horse is not "*suffering humanity*").—C. J. G.—R. F. C. (it is only necessary to have proper lightning conductors in addition).—W. H. (we do not believe it has ever been done in London; and probably there are not many London-built brick houses that would stand the operation).—S. & Co.

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.

We are compelled to decline pointing out books and giving addresses.

Note.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news-items) which have been duplicated for other journals, are NOT DESIRED.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; all communications relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

Bath Stone.

BEST QUALITY OF ALL KINDS.

PICTOR & SONS,
Box, Wilts. [Advt.

Doulting Freestone.

THE CHELYNCH STONE. The stone from these quarries is known as the "Weather Beds," and is of a very crystalline nature, and undoubtedly one of the most durable stones in England.

THE BRAMBLEDITCH STONE. Is of the same crystalline nature as the Chelynch Stone, but finer in texture, and more suitable for fine moulded work.

HAM HILL STONE.

Greater facilities have been provided for working these quarries, and the stone can be supplied in large quantities at short notice.

Prices, and every information given, on application to CHARLES TRASK & SONS, Norton-sub-Hamdon, near Ilminster, Somerset.
London Agent — Mr. E. WILLIAMS,
16, Craven-street, Strand, W.C. [Advt.

Doulting Free Stone / **HAM HILL STONE,** / **BLUE LIAS LIME** / **(Ground or Lump),** For prices, &c., address S. & J. STAPLE, Quarry Owners, Stone and Lime Merchants, Stoke-under-Ham, Ilminster. [Advt.

Ham Hill Stone! Ham Hill Stone!!!

For Ham Hill Stone of best quality and workmanship, apply to JOHN HANN & SON, Quarry Owners, Montacute, Ilminster. Established 1837. Agents, MATTHEWS & GEARD, Albany Wharf, Regent's Park Basin, N.W. [Advt.

Asphalte.—The Seyssel and Metallic Lava Asphalte Company (Mr. H. Glenn), Office, 38, Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk-rooms, granaries, tun-rooms, and terraces. [Advt.

Asphalte.
Seyssel, Patent Metallic Lava, and White Asphaltes.
M. STODART & CO.
Office:
No. 90, Cannon-street, E.C. [Advt.

BANNER VENTILATORS.

The Strongest Exhaust Ventilators for all Buildings, Public Halls, Churches, Billiard-Rooms, &c.

HIGHEST PRIZES at all the most important Exhibitions.

BANNER SYSTEM OF SANITATION AND SANITARY APPLIANCES

WERE AWARDED AT THE

International Health Exhibition, 1884, One Gold Medal, Three Silver Medals, and One Bronze.

For further Particulars and Prices apply to

BANNER SANITATION COMPANY.

Wessex House, Northumberland Avenue, Charing Cross, London, W.C.